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1-888-248-4893
PUBLISHER & EDITORIAL DIRECTOR
PAUL NOLAN ext 202
Paul.Nolan@BetterFarming.com

MANAGING EDITOR
ANDREA M. GAL, PhD ext 201
Andrea.Gal@Farms.com

OFFICE ADDRESS
52 Royal Rd., Unit A,
Guelph, Ontario
N1H 1G3

EDITORIAL TEAM

ASSOCIATE EDITOR
JAN KERTESZ

STAFF WRITERS
KATE AYERS
JACKIE CLARK
DIEGO FLAMMINI

CONTRIBUTORS TO THIS EDITION
MOE AGOSTINO
ABHINESH GOPAL
HOLLYN MALONEY
RICHARD SMELSKI

ADVERTISING TEAM
GLENN RUEGG
JENNY LONGSTREET

DESIGN & PRODUCTION TEAM
TANYA MYERS
GREG MARLOW
SHAUN CLARK
ANDREA WILLIAMS

COVER
Jodie Aldred photo; Dr. Lee-Anne Huber photo

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LETTERS FROM A FAMILY FARM

DIVERSE FORMS OF COLLABORATION

Throughout my years in the industry, I have always appreciated the opportunity to learn about informal and formal collaborations.

At the community level, we see neighbours rally together to help a fellow farm family in the event of injury, illness or death.

During the pandemic, it's particularly heart-warming to hear the stories of producers working through their general farm or commodity organizations to donate to food banks, provide meals to front-line workers, and supply these workers with personal protective equipment. Producers are dealing with supply chain interruptions, market volatility and labour challenges, yet they still unite to assist others.

In addition to these societal benefits, collaboration is key to advancing knowledge. Producers work with researchers, for example, to trial new nutrition programs or enrichment methods. Companies partner on innovative projects.

Arguably, some of the most intriguing collaborations involve players outside of the traditional ag industry space. In the precision ag sector, for example, individuals from tech backgrounds bring innovative ideas to the agricultural industry.

Perhaps a lesser-known subset of collaborations exists between the ag and biomedical sectors.

This month, staff writer Jackie Clark provides a glimpse into this field of research. She connects with scientists who use pigs to expand our knowledge of human health. These scientists trial new medical interventions that can ultimately help to save human lives.

As always, our writers also share information with practical applications on the farm. Staff writer Kate Ayers, for example, discusses strategies for strengthening a gilt replacement program and Dr. Hollyn Maloney outlines how to manage *Rotavirus* in your barns.

I encourage you to get in touch to share your thoughts on this edition's content or to suggest story ideas. After all, collaboration with writers, industry stakeholder interviewees and readers enables us to produce insightful and timely content.

Andrea

Graeme McDermid photo

Graeme McDermid grew up with an affinity for working with pigs. He enjoys helping farmers reach their production goals. Read his story on page 26.

National Pork Board and the Pork Checkoff, Des Moines, Iowa photo

STRICTER U.S. RULES NEEDED FOR CULL SOW MOVEMENT

Each year, over 3.2 million cull sows enter the U.S. marketing channel but industry stakeholders know minimal information about their journey.

"We have information about when pigs (leave) the farm and when they arrive at the slaughter plant. We don't know what happens between when the pigs arrive at the first buying station (and when they reach) the slaughter plant," **Dr. Benjamin Blair** said to *Better Pork*. He's a veterinarian and a PhD candidate in the **University of Illinois at Urbana-Champaign**'s college of veterinary medicine.

"We have thousands of sow farms that are consolidated into a few hundred collection points, which are then further consolidated into around 25 slaughter plants," Blair said.

"The average (length) is around three days but about 10 per cent of those pigs remain in the channel for greater than five days," Blair said. The incubation period of diseases such as porcine epidemic diarrhea and porcine reproductive and respiratory syndrome fits into this window.

So, "you now have a (pathogen) reservoir sitting at one of these buying stations," he said.

To decrease disease risk and improve animal welfare, the industry needs "stricter … rules regarding the amount of time these animals remain in" the system, Blair said. And stakeholders need accurate and updated data from all parts of the marketing channel, he added. **BP**

MYSTERIOUS RASH APPEARS ON SOWS

The **Canada West Swine Health Intelligence Network** (CWSHIN) is trying to develop a baseline understanding of what it calls "purple sows."

"The only thing we really have that is incumbent for this condition is that sows get a purple rash or discolouring on their bellies and legs," **Dr. Jette Christensen**, manager of the CWSHIN, told *Better Pork*. "Maybe there are many causes for it; we don't know."

The CWSHIN leadership learned of a loose housing site that had about 30 weaned sows with the purple blotches on their bodies. After one week, the animals' skin returned to normal colour and tests didn't show any definitive diagnoses. Other producers reported rare cases of this condition, the CWSHIN website said.

The organization has also received descriptions that match a condition called porcine circovirosis. A symptom of that potentially fatal disease is purple-looking spots on the pig's body.

"We need to know if we're dealing with the same (disease) or if (the purple sows' condition) is something different," Christensen said.

Pork producers completed a survey on the topic on the CWSHIN website this summer.

The CWSHIN leadership will use the survey results to determine if they need to study the condition further, Christensen said. **BP**

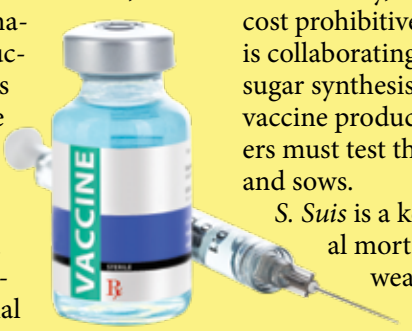
SWINE RESEARCHERS BATTLE S. SUIS

Scientists have made progress in the industry's effort to address *Strep suis (S. suis)*.

The challenge lies in the fact that *S. suis* has many phenotypes. Antibodies that protect against one type of the bacteria will be different than the antibodies that protect against another type, **Dr. Marcelo Gottschalk** told *Better Pork*.

He's a professor in the faculty of veterinary medicine at the **University of Montreal**.

Currently, producers use antibiotics to try to treat the disease as no commercial vaccine exists, Gottschalk said. Alternatively, some producers use autogenous vaccines to handle the strain of *S. suis* isolated on their farms.



Gottschalk and his team are developing a commercial vaccine to protect pigs from multiple types of *S. suis*.

"We have identified some proteins that are present in almost all strains of *S. suis*," he said. "We have partial protection with that vaccine."

But the variability in *S. suis* is tied to differences in the sugar-based capsule of the bacteria. Unfortunately, sugars do not typically serve as good antigens, which are the substances that stimulate an immune response. So, the scientists are linking the sugar and protein to formulate a better vaccine for this disease.

Currently, this type of vaccine is cost prohibitive, Gottschalk said. He is collaborating with an expert in sugar synthesis to lower the cost of vaccine production. Then, researchers must test the vaccine in piglets and sows.

S. Suis is a key cause of "bacterial mortality in piglets after weaning," the *Merck Vet Manual* said. **BP**

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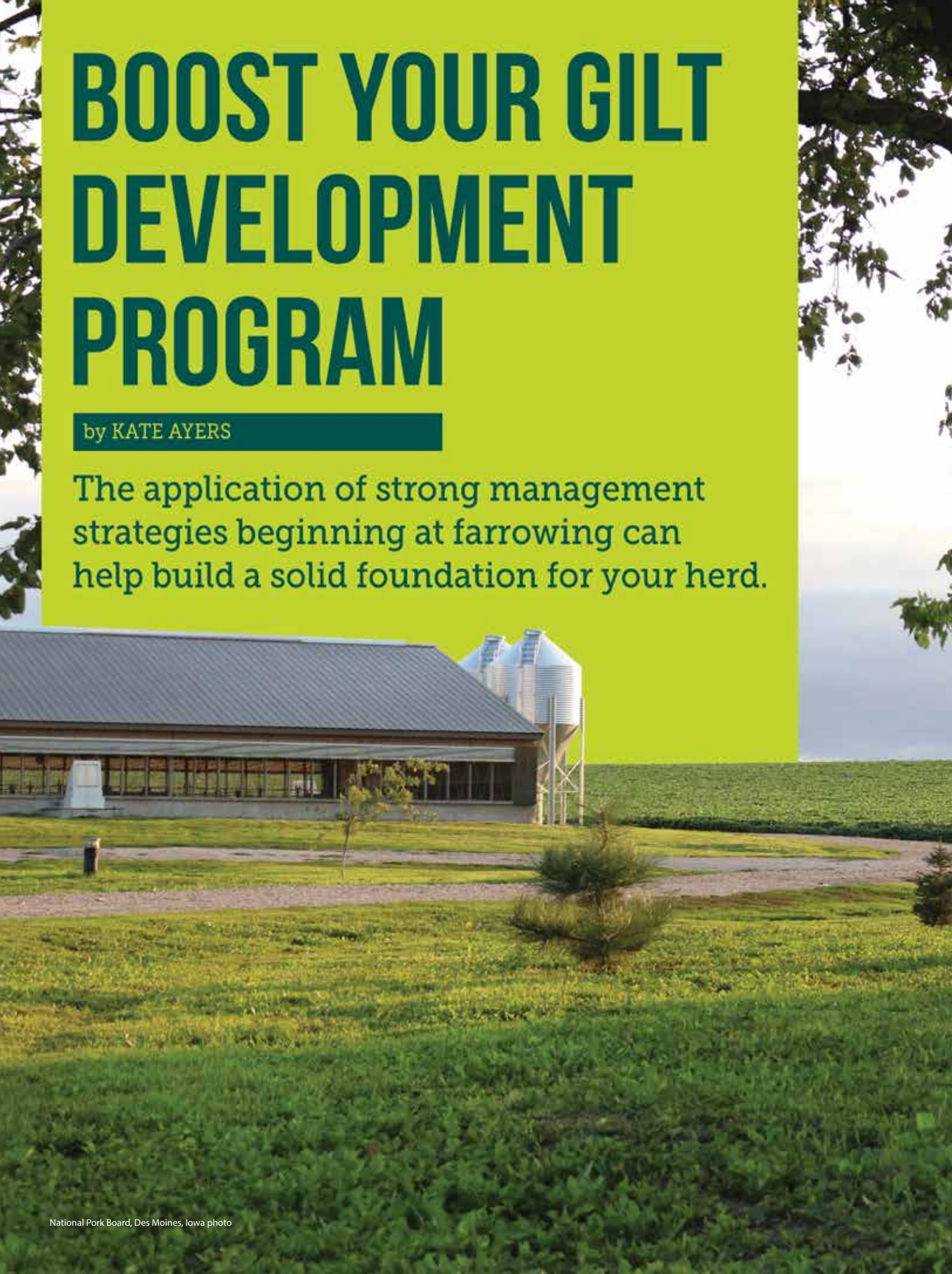
BOOST YOUR GILT DEVELOPMENT PROGRAM

by KATE AYERS

The application of strong management strategies beginning at farrowing can help build a solid foundation for your herd.



National Pork Board, Des Moines, Iowa photo

As swine industry stakeholders continue their quest to optimize production and balance sheets, farmers should closely examine their gilt development programs.

"The time from entry at selection to first breeding as a gilt is when a sow accumulates the most non-productive days," says Dr. Clay Lents. He's a research physiologist with the U.S. Department of Agriculture's Meat Animal Research Center in Clay Center, Nebraska.

Proper gilt management helps to ensure this segment of the herd does not negatively affect an operation's bottom line. A "gilt needs to reach 2.5 parities before she becomes profitable, meaning that she has produced enough pigs to pay for the cost of her development," Lents says.

Given the costs and labour involved, producers need strong gilt development programs to help generate productive and profitable herds.

Overall, a good program includes "a series of small advantages at each step of the way that accumulate over time," Lents says.

Unfortunately, however, these incremental gains "don't show up until the second or third parity. That aspect makes it really hard to identify phenotypic traits that can predict lifetime productivity," Lents explains.

"A solid gilt management program ultimately must deliver the right amount of gilts at the right time, at a reasonable cost with high probability of having" large first and subsequent litters, adds Dr. Juan Carlos Pinilla. He's a director of global technical services for applied reproduction at PIC North America in Tennessee.

PIC focuses on genetic improvement, secure delivery of genetics to producers, and on-farm technical services to help farmers optimize production.

Each farmer needs a tailored approach to gilt management that can help him or her achieve breeding targets and production goals.

Better Pork speaks with a nutritionist, a swine production specialist and other industry experts to learn how producers can structure sound gilt development programs. We also review the logistics of boar exposure and other management decisions farmers should consider to ensure they bring the best replacement gilts into their herds.

Herd efficiency

"Gilts are the foundation of the herd," Dan Bussières said at the Banff Pork seminar earlier this year. He's a swine nutritionist and co-owner of Groupe Cérès Inc. in Lévis, Que.

"Good management in gilts' first cycles is key to optimize herd lifetime performance."

Groupe Cérès supports Canadian pork producers in such areas as genetics, nutrition and research, the company's website says.

Gilts account for a notable portion of a breeding herd.

"Gilt litters amount to about 25 per cent of the total litters born each week, so their performance can definitely impact a farm's performance and financial results," says Pinilla.

Producers must select the right gilts for their herds or they will experience high sow turnover.

"We have to ensure we have good-quality gilts available all the time to replace old and unproductive animals," Dennis Robles adds. He's the production specialist for Swine Health Professionals Ltd. in Steinbach, Man.

Swine Health Professionals Ltd. helps farmers develop herd health plans, monitor production progress, and maintain biosecurity targets, the company's website says.

"Typical culling rates are around 50 per cent," Lents says.

"Higher rates mean that producers have to retain more gilts to meet those replacement needs." In such cases, farmers need larger gilt development units (GDUs), more boars for gilt stimulation and more personnel to manage those animals. As efficiency decreases, costs add up quickly.

Guide to gilt management

Effective gilt management begins at birth, many experts agree.

"Litter of origin, lactation management and the application of early selection strategies are (initial) indicators of future performance and efficiency," say Jennifer Patterson and Dr. George Foxcroft in a July 2019 article called "Gilt Management for Fertility and Longevity."

Patterson is a research associate in the faculty of agricultural, life and environmental sciences at the University of Alberta in Edmonton. Foxcroft is a professor emeritus in the university's department of agricultural food and nutritional science.

Individual birth weight, litter birth weight and the sex ratio of the birth litter also help predict gilt performance, studies show.

Extremes in birth weight – either too low or too high – can negatively affect the reproductive potential of replacement females, Patterson and Foxcroft say.

Ideally, gilts should weigh about 1.7 kilograms (3.7 pounds) at birth, Lents says. And producers should not select pigs under 1.1 kgs (2.4 lbs.) at birth for replacement gilts, Bussières suggests.

Also, gilts must receive "adequate levels of colostrum to support the development of the reproductive tract," Lents adds.

"The reproductive development of gilts that don't get enough colostrum in that first day of life is delayed. They can still get into the herd, but they produce fewer piglets."

Pre-weaning growth rate serves as another indicator of lifetime reproductive potential, Lents says.

Gilts should gain a minimum of between 0.6 and 0.7 kgs (1.3 and 1.5 lbs.) in weight per day from birth to selection for breeding. "Below that range, the risk is higher for reproductive impairments," he says.

And the size of the litter that replacement gilts grow up in can affect future performance.

Reducing "litter size from 12 to six pigs has shown to improve gilt performance," Bussières says. In total, 40 per cent of gilts from smaller litters

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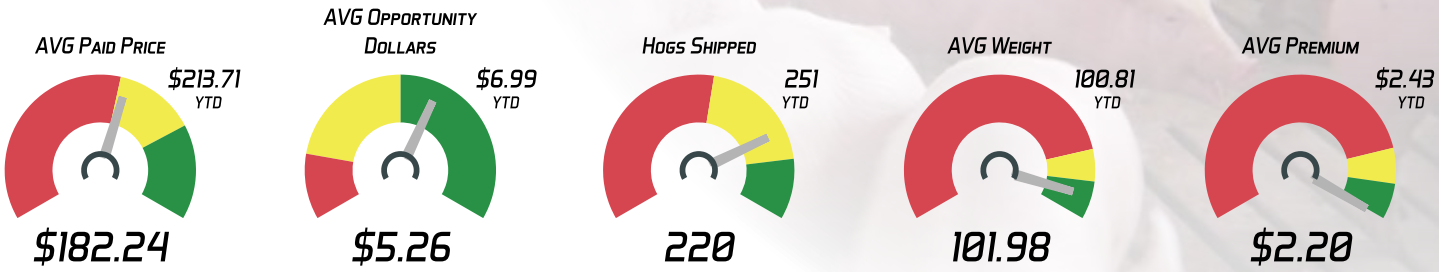

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reach parity six. In contrast, due to pre-weaning competition, only 20 per cent of gilts from larger litters reach this stage, he adds.

"Although we know (the pursuit of a smaller litter size) is not a practice that we would apply commercially, such data support the fact that optimizing performance of future replacement females during their (suckling) period will improve lifetime performance and longevity," Bussières says.

Producers can house gilts during the nursery phase at the same density as commercial pigs. This density is about 0.28 square metres (three square feet) per pig if the producer is raising the animals to 30 kgs (66 lbs.) in the nursery barn, he says.

Overcrowding "can lead to issues with tail and ear biting," he says.

"Generally, when gilts reach about 30 kgs (66 lbs.), producers transfer these animals into the grow-finish section or a GDU," Bussières says.

In this section, gilts should have at least 0.74 sq. m (eight sq. ft.) of space until the animals weigh between 100

National Pork Board and the Pork Checkoff, Des Moines, Iowa photo

Gilts should gain a minimum of between 0.6 and 0.7 kgs (1.3 and 1.5 lbs.) in weight per day from birth to selection for breeding.

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and 120 kgs (220 and 264 lbs.). Floor quality is very important during this period to help ensure proper leg development and soundness.

Once gilts reach the desired weight, producers either move them into an acclimation barn or the main sow herd, Bussières says.

At this stage, gilts need more space – between 1.11 and 1.3 sq. m (12 and 14 sq. ft.) per animal, he says.

In the breeding animal selection process, farmers should consider such phenotypic traits as the number of functional teats. At maturity, gilts should have a minimum of 14 teats. Gilts should have sound conformation with good anterior and posterior leg quality, and good back lines. The animals should also have well-developed vulvas, Bussières says.

While physical traits are important, internal reproductive characteristics may be even more critical for productivity, Robles says.

"Hormonal development and the environment she was raised in are some key factors in gilt development," he says.

Pen and stall design and "where the boars are placed in the barn have huge influences on hormonal development," Robles says.

"Positive human interaction and handling are also very important factors to make sure the animals stay in the herd longer."

National Pork Board and the Pork Checkoff, Des Moines, Iowa photo

Producers can house gilts during the nursery phase at the same density as commercial pigs.

Breeding success

"Early puberty is important for sow lifetime productivity," Lents says.

Several factors – including housing, climatic environment, season, feeding systems and health status – can affect gilts' pubertal onset, say Patterson and Foxcroft. For example, puberty may be delayed if animals are in poor body condition.

"Failure to select gilts with the greatest reproductive potential, and inappropriate management of their physiological state and metabolic condition at service, are key risk factors for poor sow lifetime productivity," they add.

Robles agrees.

Post-weaning, the period between first heat and service is important to ensure gilts develop and cycle properly, he says.

By exposing gilts between 160 and 170 days of age to boars, farmers can select and move the appropriate animals into the next production phase, Bussières says.

Exposing females to high-libido boars can "trigger the onset of puberty" in gilts, Pinilla says.

"If properly done, boar exposure can also synchronize the ovarian activity in a homogenous group of gilts," he adds.

Ideally, gilts should have between 15 and 20 minutes of boar exposure each day, Lents says. But it is "hard for farmers to dedicate that much time, which limits the effectiveness of boar exposure and reduces the number of cycling gilts," he says.


Dr. Clay Lents

"Exposing boars along a fence line works but exposing gilts to vasectomized boars in the pen is the most effective way to stimulate puberty in gilts."

Producers should introduce a boar to a pen with a maximum of 17 gilts to avoid overworking the male, Lents says.

Farmers should also "rotate boars so gilts are exposed to different boars on consecutive days" and the boars can rest, he says.

Farmers should select gilts that had their first heat before 210 days of age, Bussières says.

Following their first estrus but before their introduction to the breeding herd, gilts should be acclimatized for at least 14 days, Lents says. Gilts that are not properly acclimatized could lose back fat. Declines in body condition before breeding are not ideal, he says.

Acclimatization can also help gilts build immunity.

Farmers can integrate a cull sow with the gilts, so "they can be exposed to diseases before entering the sow barn," says Robles.

Producers should consider time of breeding as well, as this decision can significantly influence the lifetime productivity of the animals.

Typically, farmers should not breed gilts based on chronological age "because pubertal age can range pretty widely. Instead, we ought to breed based on body weight," Lents says. The optimal weight range to breed gilts is between 135 and 160 kgs (297 and 352 lbs.).

"Gilts should be eligible for breeding at their second or third estrus," he says.

At this stage, "they should have enough body size to sustain reproductive performance and have adequate litter sizes at farrowing."

Indeed, "first- and second-parity litter sizes (are) predictive of later lifetime performance and the appropriate management of a gilt at first service is, therefore, important to improve first-parity litter size and these lasting effects on lifetime production," Patterson and Foxcroft say.

"The cumulative effective of poor management of the gilt prior to service limits the ability of the sow to produce pigs in subsequent parities."

Nutrition

A well-balanced ration and adequate energy intake throughout the gilt development phase are important to maximize gilts' reproductive potential, Patterson and Foxcroft say.


Dr. Juan Carlos Pinilla

Poor nutrient availability "limits growth rate and, if restriction is severe, ovarian development could be limited as well. Both situations could damage or hinder reproductive results and longevity," Pinilla adds.

Ad libitum feeding is a good option for developing gilts.

"The objective during the period when gilts are between 25 and 120 kgs (55 and 264 lbs.) is to ensure proper growth and structural development, while trying not to achieve very high average daily gain," Bussières says.

"Feeding lower-energy diets and dry feed are ways to help control growth. Restricted feeding isn't a preferred way to limit growth, especially after gilts reach 50 kgs (110 lbs.).


Dan Bussières

This approach can compromise mammary gland development," he adds.

Farmers should also ensure rations contain sufficient vitamins and minerals for developing gilts.

Gilt feed should have between 0.1 and 0.2 per cent higher calcium amounts and 0.1 per cent higher digestible phosphorus compared to standard finisher diets, Bussières says.

"Also, we would normally recommend using a gilt VTM (vitamin and trace mineral) or a sow VTM in gilt-developer diets," Bussières says.

The inclusion of organic trace minerals, including copper, zinc and manganese, could support good leg and hoof quality, he adds.

Once gilts reach their breeding weights, "a late-gilt-developer diet could be used or we would normally use what we call a gilt-maturation diet," Bussières says.


Following their first estrus but before their introduction to the breeding herd, gilts should be acclimatized for at least 14 days, Dr. Clay Lents says.

National Pork Board and the Pork Checkoff, Des Moines, Iowa photo

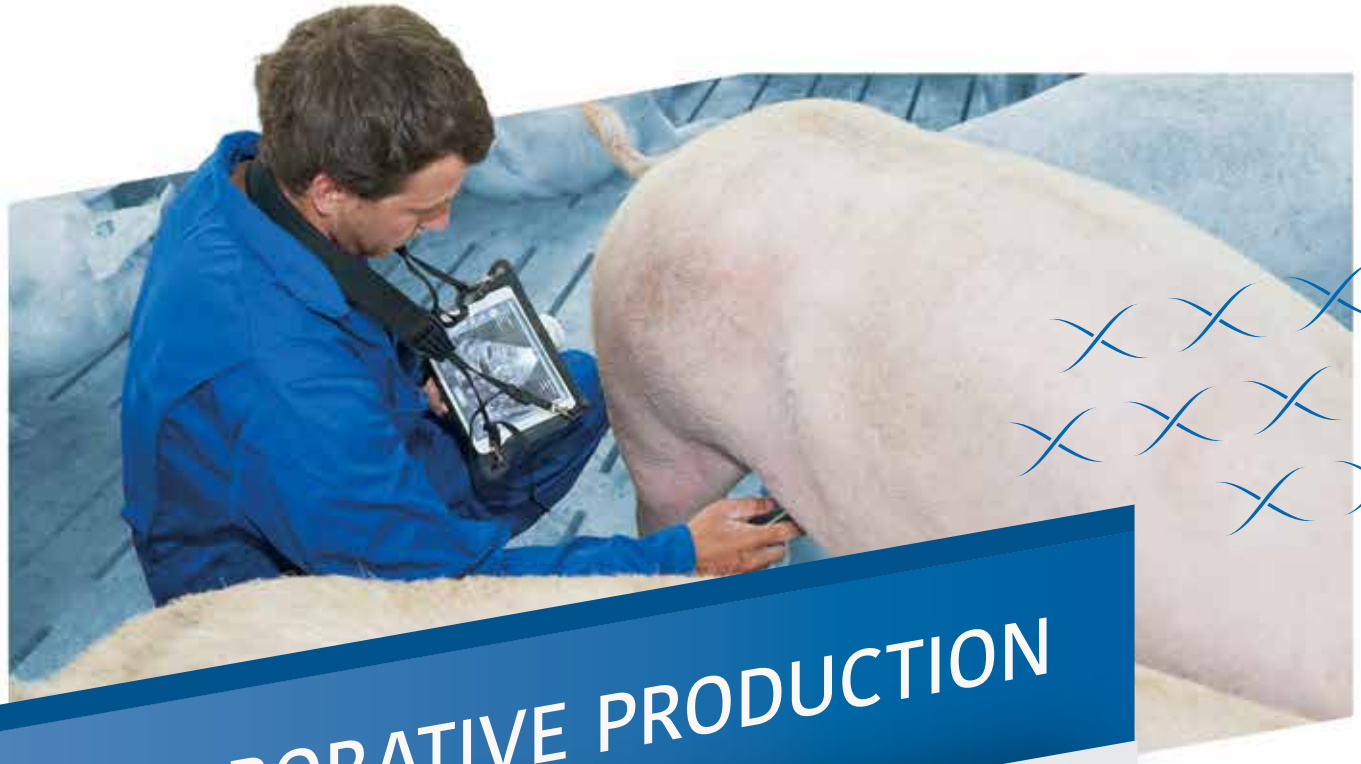
"This diet is lower in protein and amino acids, but higher in energy to promote fat deposition before breeding," he explains.

Ad libitum feeding during the first wean-to-estrus period could boost weaned gilts' performance.

"Data from a large trial done at HyLife shows a significant improvement in performance when weaned gilts were fed between 0.68 and 0.91 kgs (1.5 and 2.0 lbs.) of feed during the wean-to-service interval," Bussières says.

The "number of days before breeding improved by 3.5 to four days, conception rates increased by 13 per cent and the next litter had an average of an extra 0.6 pig per litter."

Given the complexity of factors involved in ensuring a strong gilt development program, set your operation up for success through careful staff oversight of the herd and timely consultations with your vet and swine nutritionist. **BP**



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New report from Schothorst Feed Research:

AX3 is 15% more digestible than LT fishmeal

"In piglets, the refined protein AX3 has significantly better protein digestibility than high protein (HP) soybean meal and low temperature (LT) fishmeal," says researcher Anne Huting from Dutch-based Schothorst Feed Research (SFR), who conducted a comparative study of the three protein sources (see Tab. 1). The study was performed by measuring the results in piglets 21 days after weaning (day 49).

Table 1: Protein digestibility

	Feed	Protein source
Control feed	78.5%	
HP soybean meal	75.9%	71.7%
AX3	82.0%	82.9%
LT fishmeal	74.9%	68.6%

Protein digestibility

The SFR study found far lower protein digestibility than previously believed for HP soybean meal and LT fishmeal. SEGES feed table indicates 92% and 89.5% respectively. Protein digestibility is typically calculated as the average of the period from day 42 to day 85 in piglets. The age and growth of the piglets are thus decisive for the levels of digestibility achieved.
Despite the SFR study already performing measurements on day 49, AX3 demonstrates significantly higher protein digestibility.

Feed digestibility

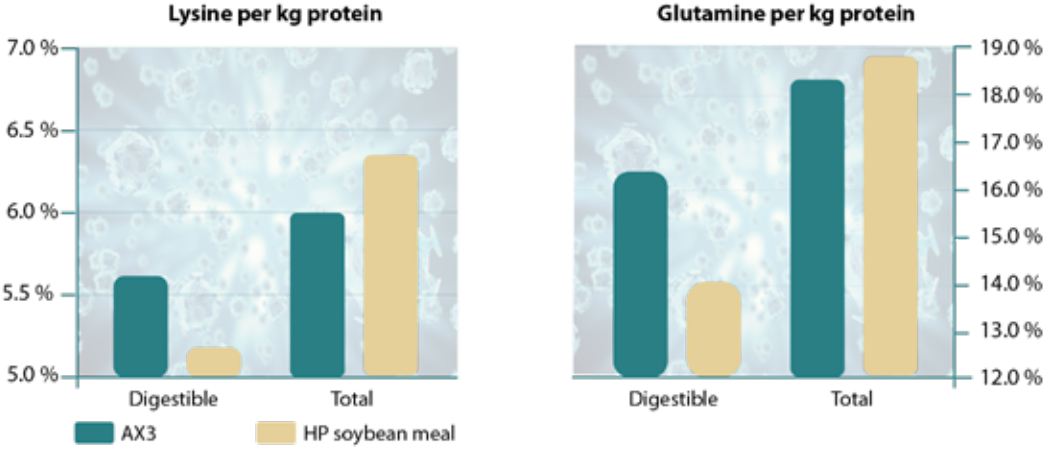
In the control feed with 12% protein, digestibility was measured at 78.5%. When raising the protein content to 21.9%, the overall change in protein digestibility of the feed is largely determined by the protein source (see Tab. 1).
HP soybean meal and LT fishmeal bring down the digestibility of the feed, while AX3 increases the digestibility. The reason for this is that AX3 has a very high water absorption capacity, which positively impacts the viscosity of the feed in the stomach and thereby prolongs the time the feed remains in the stomach. This provides more time to break down the protein in the feed.

Digestion in the small intestine

When the feed passes on to the small intestine, a significant change in pH value occurs. Sodium bicarbonate ($NaHCO_3$) is added from the pancreas, raising the pH to approximately 7, which is optimal for the digestive enzymes from the pancreas and gall bladder. $NaHCO_3$ also helps to protect the intestinal wall from the strong acid added to the feed while in the stomach.

"The small intestine is the part of the digestive system where protein/

Figure 1: Comparison of digestible and total content of lysine and glutamine (%)



Choice of protein source is important

The breakdown of protein begins in the stomach at pH levels below 4. The enzyme pepsin, which is excreted in the stomach, plays a key role in the breakdown of protein into amino acids that can be absorbed in the small intestine. As described in the April edition of Better Pork magazine, the low acid-binding capacity (ABC4) of the feed is essential for good protein digestibility in newly weaned piglets.

Choice of protein source is important. Using HP soybean meal or LT fishmeal increases the ABC4 value of the feed, complicating the necessary acidification of the feed by the stomach. AX3, on the other hand, reduces the ABC4 value of the feed, thereby helping the piglets achieve a pH below 4 in the stomach.

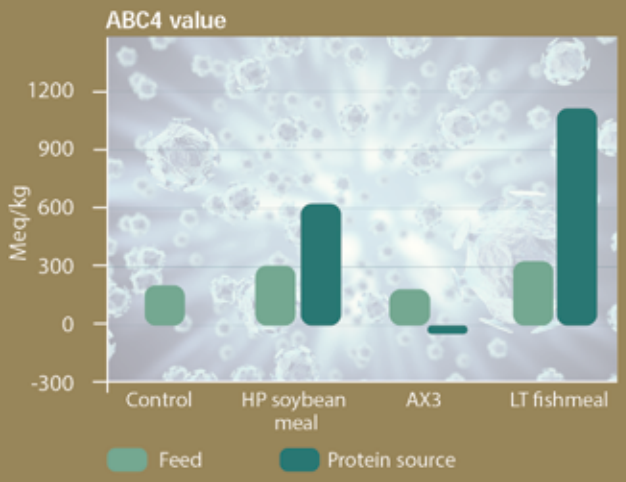
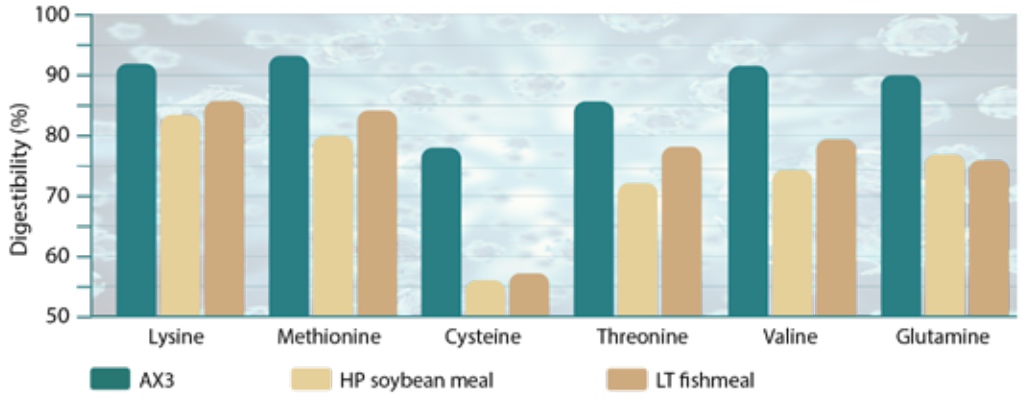


Figure 2: Comparison of amino acid digestibility in the small intestine



amino acids are absorbed. Interestingly, a comparison of the lysine/protein ratio shows that HP soybean meal has more lysine per kilogram of protein than AX3, but AX3 has higher digestibility of lysine per kilogram of protein than HP soybean meal. The same applies for 17 other vital amino acids. In particular, the digestibility of glutamine is significantly higher," says Huting from SFR (see Fig. 1).

Glutamine plays a key role in the development of the intestinal system of piglets, as it increases the area and weight of the intestinal wall. The SFR study shows that the content of digestible glutamine from AX3 in the small intestine is significantly higher than that of HP soybean meal or LT fishmeal. The importance and properties of glutamine are further detailed in the May issue of Better Pork magazine.

AX3 restores digestibility

During the manufacture of HP soybean meal, the digestible amount of amino acids is reduced, which has been documented by measurements of 49-day-old piglets. With their patented process, TripleA is able to restore the digestibility of the total amino acids by 15% (see Fig. 2).

A comparison of AX3 and LT fishmeal similarly shows that the digestibility of the total amino acids is significantly higher with AX3 (see Fig. 2).

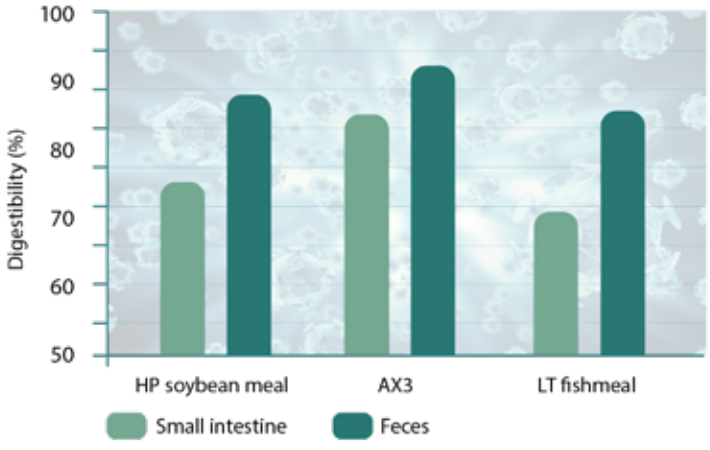
Undigested protein can cause weaning diarrhea

Figure 3 shows the digestibility of protein in the small intestine and in the feces for the different protein sources. As in the small intestine, the results from the feces show higher digestibility in AX3 compared to HP soybean meal and LT fishmeal. The difference between digestibility measured in the small intestine and in feces further shows that both HP soybean meal and LT fishmeal have a higher degree of fermentation of the undigested protein in the large intestine than AX3.

The fermentation of undigested protein can cause weaning diarrhea as a result of E. coli growth. During fermentation, E. coil also excretes waste that negatively impacts intestinal health.

"Highly digestible protein can be a means of reducing the risk of weaning diarrhea, thus improving the growth and health of piglets," says Huting from SFR.

Figure 3: Comparison of digestibility of three protein sources in the small intestine and feces



In the next issue, we review the results of a study conducted by Schothorst Feed Research in the Netherlands that compared the digestibility of AX3 with other protein feed substances

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3:5

Increased growth without zinc

It is important to focus on what happens in the piglet's digestive system during the critical weaning period. This fact has been overlooked as the industry made huge advances in productivity over the past decades.

In the next two issues of Better Pork magazine, we discuss the importance of knowing what happens in the stomach and small intestine, and the importance of your choice of protein source. We explain how you can eliminate the need for zinc, prevent diarrhea, and even achieve higher growth with high protein content in the feed.

tripleA

HOW SCIENTISTS USE PIGS TO SAVE LIVES

by JACKIE CLARK

Better Pork explores some of the ways that pigs have contributed to biomedical research, and how scientists' use of these animals may support new medical advances.

National Pork Board, Des Moines, Iowa photo

In the spring, a team of researchers – including University of Illinois at Urbana-Champaign scientists and industry partners – approached a professor in the university's animal sciences department to collaborate on a project intended to help address the COVID-19 crisis.

The team developed the Illinois RapidVent ventilator. The researchers designed the device so that manufacturers could rapidly produce it to address a potential ventilator shortage during the pandemic.

The scientists needed to test the device and wanted to use pigs as a model for human health. Dr. Matthew Wheeler, the professor in animal sciences, was a logical choice for the project. He has cross appointments in bioengineering and veterinary clinical medicine, and is experienced in the use of pigs in medical research.

"The pig is becoming more and more relied upon, not only to feed humans, but also to save human lives," Wheeler tells *Better Pork*. This ventilator testing serves as one recent example of that process.

This month, we connect with professors from Canada and the United States to learn why researchers use pigs to advance medical research. We explore how scientists manage pigs that researchers use in these studies. Finally, we review some medical advances made to date and consider what the future may hold.

Why use pigs?

Researchers began using pigs in medicine in the 1970s.

"I was director at the surgical lab at Johns Hopkins (School of Medicine) in the '80s and I taught surgery to medical students. At that time, they used dogs (to practice surgical methods). I decided to see if we could use pigs instead," Dr. Michael Swindle tells *Better Pork*.

He's an international leader in the use of swine as a human surgical model. He is a professor emeritus and he served as chair of the department of comparative medicine at the Medical University of South Carolina. He independently consults on the use of swine in biomedical research.

"Once they saw that it worked, the rest of the researchers involved in surgery labs (at Johns Hopkins) gradually made the switch from different species over to pigs," he says. However, some "companies and scientists were reluctant to change models because they had a lot of background working with dogs or primates."

Swindle and his colleagues published many articles and books about the use of pigs in medicine. In the early 1990s, the practice became more widespread in the North American scientific community.

In the late 1990s, the Food and Drug Administration (FDA) in the United States and the corresponding authority in the European Union announced they would accept data for new products from research conducted on pigs, Swindle says.

In Canada, Health Canada determines which animals are appropriate for pre-clinical studies. Pigs are included in the list of large animal models that scientists may use to help evaluate risks before conducting clinical trials on humans.

Once the FDA made its announcement, many scientists at pharmaceutical and medical companies transitioned to conducting research with pigs, Swindle adds.

"The pig is a great biomedical model. In a 200-pound (90-kilogram) pig, the heart, lungs and kidneys are pretty similar in size to a (155-lb.) 70-kg human," Wheeler says.

Another benefit of using pigs in research is animal longevity, says Dr. Vilceu Bordignon. He's an associate professor in reproductive biology at McGill University in Montreal. Pigs "live longer than (traditional) laboratory animals," he says.

By using pigs instead of rodents, scientists can conduct "more translational research from fundamentals to clinical applications," he explains. Through translational research, scientists apply basic biology or medical science to developing devices and methods to address clinical needs.


Dr. V. Bordignon

"Pigs are a more representative animal model for testing new therapies," Bordignon says.

If a drug or device "works in a pig, there's a very high likelihood that the drug or device will work in humans," says Swindle.

Pigs' "DNA code is about 85 per cent analogous to humans," Wheeler says. Pigs and humans suffer from some of the same diseases, like the flu.

In contrast, the homology between a rodent and a human "tends to be less than 10 per cent," Swindle says. Homology refers to the similarity in chromosomal or internal structures between two species.

Breed selection

Dr. Dan Columbus has used a Yorkshire-Landrace cross-breed for his research because his studies mainly focus on early life. He's a nutrition research scientist at the Prairie Swine Centre in Saskatoon.


Dr. Dan Columbus

However, commercial breeds "are not acceptable for long-term projects because they grow so fast," Swindle says. "If you put a device into the blood vessels of a three-month-old farm

pig and you go back and look three months later, the pig has quadrupled in size and, many times, the device" has detached.

It's more expensive to work with and care for commercial pigs in biomedical research than mini pigs, Bordignon explains.

So, researchers conducting long-term studies will often use miniature pigs, Swindle says.

Bordignon typically uses Yucatan mini pigs for his research involving cloned and genetically modified animals. For example, he produced cloned pigs with altered genomes using somatic cell nuclear transfer. In this technique, a scientist develops a viable embryo by implanting the nucleus of a body cell into an egg cell.

Mini pigs grow to be about 176 to 198 lbs. (80 to 90 kg) and have fewer piglets per litter than commercial sows.

Yucatan sows have about six piglets in a good litter, Dr. Lee-Anne Huber says.


Dr. Lee-Anne Huber

Huber is an assistant professor in the department of animal biosciences at the University of Guelph in Ontario. She uses Yucatan pigs to ensure nutritional studies are more relatable to humans.


Karina Gutierrez photo

Researchers used these pigs in a project investigating metabolism. The scientists modified a gene in the piglets using the CRISPR/Cas9 system.

The way "pigs digest nutrients and how they use those nutrients within their bodies is very similar to how humans do it," she says. But "commercial pigs are selected to be so efficient at using those nutrients for growth and they grow so quickly." As a result, they typically aren't the best option for comparison to humans.

Pig management

Researchers must source healthy pigs for biomedical research and care for them judiciously.

A "research project can be destroyed if you spend thousands of dollars to build a product and then the animal dies of pneumonia," Swindle says.

At the University of Illinois, for example, "we have a facility where we can do surgical work. We also have a really nice biomedical swine housing facility where we can house these animals under National Institutes of Health guidelines for biomedical models," Wheeler says.

The housing is like an agricultural setting in terms of ventilation, temp-

erature and humidity, though those variables are maintained in a tighter range in a biomedical research facility than in a typical pig barn, he says.

"Feed and watering are essentially identical" to commercial barns, he adds. The big difference is animal stocking density.

"If we're going to use a surgical model, … we have to house the pigs individually for a period of time," Wheeler says.

North of the border, the Canadian Council on Animal Care sets standards for the housing and management of animals involved in biomedical research studies.

Scientists will also conduct behavioural training on some pigs.

"We need the pigs to not be afraid of people," Swindle says. So, he trained pigs to use a sling or hammock restraining device.

"We do behavioural training in pigs as part of our effort to have animals which are free from distress when put into a new environment," he adds. "Our personnel work to bond with the pigs in a positive manner. The pig slings/hammocks are devices which give us the opportunity to humanely restrain" the animals.

Scientists view animal welfare to be of the utmost importance in their biomedical work. "We don't take these studies lightly," Wheeler says.

Areas of research

Scientists use pigs in many types of research.

"I did medical and surgical device work," Swindle says. He tested "catheters used to treat heart disease in children" as well as stents.

A stent is a type of mesh that dilates blood vessels or helps to hold other hollow structures in the human body open.

Surgeons sometimes use pig heart valves instead of artificial valves for cardiothoracic implants in human patients. Pig valves are "most commonly used in very elderly people" who require valve replacement surgery, Swindle says.

While these valves deteriorate faster, patients don't have to take anticoagulants (also known as blood thinners), like patients with artificial valves do. Typically, whenever possible, doctors prefer to simplify daily medication regimes for seniors.

Scientists have also advanced regenerative medicine through research using pigs.

"We've used stem cells from bone marrow and adipose (fatty tissue) from pigs for almost 20 years to look at things such as bone and cartilage regeneration," Wheeler says.

Some newer devices tested in pigs are well on their way to saving human lives.

"We used the 3D printing model to develop a stent for the trachea as a model for a disease called tracheomalacia. This cartilage-storage disease in the trachea is responsible for about 70 per cent of SIDS deaths in humans," Wheeler says.

SIDS (sudden infant death syndrome) occurs in seemingly healthy babies under one year of age.

That stent research is now in human clinical trials. Tracheomalacia is usually fatal by the time patients reach 12 months of age, but children in the trial are now five years of age or older.

"The pig data was instrumental in allowing the FDA to give permission to save those babies," Wheeler says.

He's also tested "3D-printed stents in the small intestine as a model for bowel rupture in humans … (and) several other scaffolding types of materials for large bone defects in human's cranial facial skeleton."

The team testing the RapidVent ventilator "decided, because of the COVID-19 crisis, to provide (designs, plans and animal testing results) freely to anyone who wanted them. … All (interested parties) had to do was sign a non-exclusive, royalty-free licence," Wheeler says. Since then, representatives from a company called Belkin have said that, pending FDA approval, the company will manufacture a product based on the RapidVent design.

Belkin is an international technology company headquartered in Playa Vista, California.

Nutrition studies

Researchers also use pigs for nutritional intervention studies for early human life, as piglets and infants can face some of the same nutritional challenges.

Jevtic/iStock/Getty Images Plus photo

Scientists view animal welfare to be of the utmost importance in their work. "We don't take these studies lightly," Dr. Matthew Wheeler says.

Ethically, it is difficult to conduct research on infants because you can't obtain consent from them, Columbus says in an interview.

"The low-birthweight pig always grows slowly and it's the same with the human infant," he says. He tested nutritional interventions to better understand the growth and development of low-birthweight piglets, and implications for human infants.

Huber has also studied early-life nutrition. Her research, however, focused on premature infants who must be fed intravenously.

"We found infants who are born

premature are more likely to develop metabolic disease – such as Type 2 diabetes, obesity and high blood pressure – as adults," she says. "The same thing would happen with pigs."

In her postdoctoral research at Memorial University of Newfoundland, she tested "different interventions to see if we could stop these pigs from developing the metabolic syndrome when they reach adulthood.

"The cool thing about using pigs as models is that they reach adulthood within a year," Huber says. "So, you get your answer within a year or so," as opposed to waiting 50 years for human clinical trials.

Though she focuses her research at the University of Guelph on commercial swine nutrition, she also collaborates with doctors at the Hospital for Sick Children (SickKids) in Toronto.

"Sometimes human infants are born too early because of heart defects, which cause respiratory issues and the infants can't breathe on their own," Huber says. "In these scenarios, those infants need life-saving surgeries to

Karina Gutierrez photo

Researchers used these pigs as part of a project investigating cell reprogramming and embryo development. The scientists cloned these Yucatan pigs by somatic cell nuclear transfer.

fix the heart defects, but their hearts and the lungs aren't developed enough for the infants to survive surgery in the first place."

Doctors at SickKids are "developing an artificial placenta," she says. "It's a fluid-filled incubator," so these infants can get oxygen and nutrients through the umbilical cord, but not have to breathe. This incubator decreases stress on hearts and lungs until infants have matured enough to undergo surgery.

Doctors are testing this method using pigs.

"The fetal mini pigs that (doctors) use are the same size as these extremely premature infants. These animals give fetal surgeons the opportunity to ensure their techniques are 100 per cent perfect and that the system will work well before the surgeons would attempt to try something like that with a human," Huber explains.

Future directions

At the Prairie Swine Centre, experts in swine research collaborate with medical doctors and dentists to study things like sutures, dentistry, and wound healing, Columbus says. Innovation is ongoing.

"The last great frontier in pig research involves brain research," Swindle says. "The anatomy and physiology of the brain have many similarities to humans," so the animals could be useful in studying traumatic brain injuries and other neurological issues.

Pigs may continue to play an important role in treating or even preventing coronavirus in humans, because pork producers deal with different types of the virus all the time, Wheeler says.

"As we move forward with (studying) infectious diseases, I think the pig will be a great model. (The pig) will continue to be a model in regenerative medicine," he adds.

Researchers are conducting groundbreaking work on transplants and genetic editing, Wheeler says.

"When I started, we didn't have those tools," he adds.

Researchers can use genetic engineering technologies, called genome editing, to edit specific genes in pigs. This technology allows scientists to "create a unique model for a disease that would not exist in nature," Bordignon explains.

This approach is useful "if you need to study a genetic condition that is important for humans," but doesn't exist in the animal you want to use to study the condition, he adds.

Scientists can create cells and then animals with the condition, which allows researchers to study it and test interventions.

Scientists can only use genetic manipulation of pigs for research purposes in Canada; these animals cannot enter the food system, Bordignon says.

Genetic research in pigs allows scientists to "test new therapies and understand the pathogenesis of disease as well as xenotransplantation. Researchers aim to develop cells and tissues that would potentially be used in humans," he says.

Xenotransplantation involves transplanting tissues or organs from one species to another, in this case from pigs to humans.

Human medicine and ag

Although the connections between pigs used in biomedical research and the animals we raise in barns for pork may seem to be minimal, livestock management is critically important in both scenarios.

"I was born and raised on a pig farm," Huber says. "There are not too many pigs in Newfoundland, and there are not too many people who know how to raise pigs. We worked at the hospital and most people there had no idea how to handle pigs. So, that's what I brought to the table."

The ability to raise and handle pigs may be a skill set that becomes more in demand as biomedical research using a swine model increases.

"I think pork producers need to stay tuned," says Wheeler. "In the future, there may even be specialized facilities that produce pigs for organs, cells and tissues. … Those farms will have to be managed differently than the standard production farm, but the pork producer knows how to raise pigs better than anybody else.

"Hopefully some forward-thinking (farmers) will get engaged," he adds. **BP**

UP CLOSE

by
KATE AYERS

DEDICATED TO HELPING PORK PRODUCERS

This Ontario swine industry professional's love for the sector shines through in his work.

Graeme McDermid has been involved in the hog industry for as long as he can remember. He grew up on a farrow-to-finish farm in Simcoe County, Ont. and has worked in the feed industry and swine production for over 20 years.

In the mid-1970s, Graeme's parents Colin and Mary Lynn started a 100-sow operation. The McDermids then decided to focus on purebred breeding stock. By the time Graeme left for college, his family had expanded the operation to nearly 600 sows, and supplied boars and gilts to producers across the province.

"Dad decided to focus more on purebred high-health breeding stock," Graeme says. So, the family transitioned from a more diversified farm to focus on pig production.

Graeme completed a two-year agricultural diploma at the University of Guelph's Ridgetown Campus.

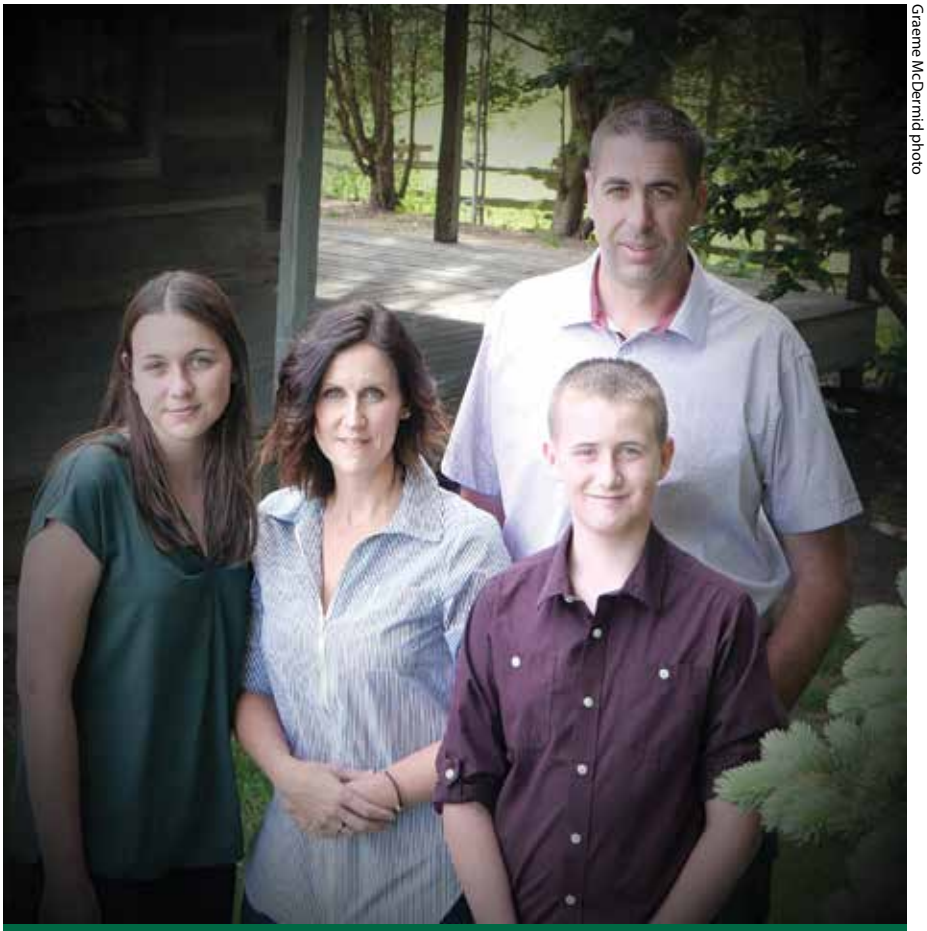
While attending Ridgetown, he started dating his future wife Christina, who also attended the college. The pair had known each other for years, having grown up in the same town. They married soon after graduation.

In 2000, Graeme worked in the feed sales sector for a short period. Then, he then took a job with Maple Leaf Foods' former Elite Swine division. He worked for six years as a field service rep, overseeing the company's owned or contracted sow nursery and finishing farms.

Over the years, he returned to feed sales, working for Hensall District Co-op and Grand Valley Fortifiers in Cambridge, Ont., and then transitioned back to the production side as the systems manager for Cronin Family Farms in Bluevale, Ont.

For the last three years, Graeme has worked at South West Ontario Veterinary Services (SWOVS) in Stratford, Ont. He leads the company's service group.

Christina also works at SWOVS.



Graeme McDermid photo

The McDermid family gathers for a photo. From left to right: Lily, 16, Christina, Cole, 11, and Graeme.

The couple have two children: Lily, 16, and Cole, 11.

As Graeme's career path shows, he always wanted to remain in the swine industry, but he knew he needed to create a place for himself.

"My family farm fell victim to 1998, which was an equally tough time in the pork business," he says. "There wasn't a farm for me to return home to, but I always loved being in the barns and being around pigs. It feels natural and right to be there.

"I've learned over the years that, as much as I wanted to have my own farm, a lot of good opportunities exist to help others who have operations. I can still be a part of the industry, just in a different capacity," he says.

And Graeme looks forward to helping Canada's swine industry navigate the challenges and opportunities it faces.

"Every time we get into a crisis situation or period like this one, we always seem to come out on the other side a little stronger and smarter," he says.

"We are learning big lessons right now about how vulnerable we are in terms of processing capacity and the effects of interprovincial trade restrictions on federally inspected meat.

"Anything that would solidify processing opportunities and market access for Canadian hogs would be quite valuable. We need Canadian-built solutions," he adds.

What is your role at South West Ontario Veterinary Services?
I lead the production services team.

How many people do you lead?
We have a small and mighty team of eight.

Hours you work per week?
The number of hours I work per week varies but I average over 60.

Hours in the office per day?
I do not have a designated office – my office is on wheels.

But I spend at least two to three hours a day at a desk.

What are three items that are on top of your desk?
A mobile phone, a laptop and a notebook are on my desk.

Email or text?
Both.

Texting for quick communication, but I prefer email for detailed or group messages.

Any favourite apps?
Twitter and WhatsApp.

What role does social media play in your daily life?
I like Twitter for staying updated about industry information. The platform is a good place to learn and share information.

What do you like best about your job?
We have a very diverse client base and a variety of opportunities and challenges in our industry.

I really enjoy getting immersed in solving challenges at our clients' farms, working with our team to problem-solve and come up with solutions to meet clients' needs.

What do you like least?
I enjoy most aspects of my job.

Except for showering out in February when it's below -20 C (-4 F) and walking to a cold truck because the remote start won't miraculously heat the cab in minutes.

What does your family think of the ag industry?
Most of my family is in ag or from rural areas. My wife is part of our SWOVS team working on Canadian Pork Excellence.

We both enjoy working with farmers and livestock daily.

What's your top tip about herd management?
Sweat the small stuff.

Details matter.

Having a team of trusted advisers can be helpful to stay focused.

What's the most important lesson you've learned?
Watch the gilts that pee in your boots.

In all seriousness, communication is the most important lesson I have learned.

It's important to have open, honest and transparent conversations with the people you work with daily.

Good communication helps to create mutual respect and trust.

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What's your guiding management principle?
Always be transparent with clients, suppliers and colleagues. Transparency creates an environment of trust and collaboration and maximizes the value of the relationships.

What's your top goal?
I have two goals that hinge together – continuing to grow our production services department and creating opportunities for the next generation of swine industry stakeholders to succeed.

How do you define success?
Success for the work we do is easy to track with our records and analytics.

Personal success is usually achieved by knowing we have made a positive impact in our clients' businesses and our industry.

Are you involved in any associations or volunteer efforts?
Currently, no. I am focused on service to our clients.

In the past, I was part of the Huron County Pork Producers Association and the Huron Perth Agriculture and Water Festival, which is an educational program for children.

What are the biggest challenges the pork sector faces and how should we address them?
Market price and the rate at which prices rise and fall have always been a challenge. Farmers have a tough challenge managing this volatility.

And the lack of processing capacity in Canada. We see the effects of this shortage due to COVID-19. We have no easy answers to these long-standing problems, so it will take collaboration across the industry to tackle and solve them.

If you could send a message to non-farmers, what would you say about the industry?
I would say that our industry is filled with awesome, caring individuals. They are all dedicated to producing a safe and affordable protein for domestic and global markets.

If you weren't working in the pork sector, what do you think you'd do for a living?
Landscaping, for sure. I love mowing grass.

Or a plumber. I'm good at it but I don't love it.

How do you support your mental health during the busy times of the year?
The swine industry is steady and does not have set busy or slow seasons.

Time spent with family and getting outside always help me unwind and, of course, mowing the grass helps too.

What are your hobbies or recreational activities?
Watching the kids play basketball, spending some time off-road in northern Ontario or Michigan, and mowing the grass.

What was the last book you read?
Tribes: We Need You to Lead Us by Seth Godin.

Graeme McDermid photo

Graeme McDermid leads the production services team at South West Ontario Veterinary Services in Stratford, Ont.

How often do you travel?
A couple times a year, mostly for work.

Where did you last travel to?
Banff, Alta.

Is your work vehicle messy or neat?
Mostly neat. After a long week, it needs some organizing.

What's the best time of day?
I enjoy early mornings. Mornings provide good thinking time before the rest of the world wakes up.

What years have been the most memorable in your career? Why?
Tough question. A couple of years stand out.

Most recently, 2019 was good. The production team accomplished some great things and I am very proud of what they did.

In 2002, I became part of the fast-expanding Elite Swine team in Ontario. I had a great group of mentors during that time who helped me get to where I am today. **BP**

HOW TO IDENTIFY AND MANAGE ROTAVIRUS

by
DR. HOLLYN MALONEY

To control scours caused by *Rotavirus*, we need to focus on early piglet care and environmental management.

Rotavirus (RV) can cause scours in pigs from 24 hours of age to 10 weeks of age, although the infection occurs most commonly in pigs over seven days of age. Pigs become infected by oral contact with contaminated feces. The mortality of affected pigs varies between farms but *RV* can contribute significantly to pre-weaning mortality.

Symptoms and diagnosis

The most common symptom of *RV* is scours that lasts for three to five days. The scours are often lighter in colour than normal feces or may be yellow.

RV damages the intestinal lining. Without this specialized lining, pigs cannot absorb the water and nutrients they consume. So, everything rapidly passes out, creating scours.

In severe cases, pigs may suffer from dehydration due to their inability to absorb water. Sunken eyes indicate that pigs are dehydrated. Pigs may occasionally vomit.

Three species of *RV* affect pigs: *Rotavirus A (RVA)*, *B (RVB)*, and *C (RVC)*. While the disease caused by each species is indistinguishable, control strategies vary between species. Veterinarians can conduct diagnostic tests on fecal or intestinal samples to determine which species is present on your farm.

Treatment

Your veterinarian can work with you to develop a treatment protocol if he or she diagnoses your herd with *RV*. Treatment focuses on supportive care because no drugs are available to cure *RV*.

Give scouring piglets free access to electrolytes to prevent dehydration. Scours cause a rapid loss of fluids and dehydration can be fatal if severe.

Keep scouring litters dry. Piglets will lose more heat through evaporation if they are wet and can become chilled. Regular application of a drying agent in the creep area will help keep piglets dry and prevent chilling.

Dr. Jessica Law photo

This scouring litter piles under the heat lamp. Scouring piglets are easily chilled. So, producers should regularly check creep temperature, prevent drafts and apply a drying agent in the creep area.

Producers can also feed piglets a kaolin-containing product. These products help to coat the inside of the digestive tract and protect it from damage. They also absorb toxins produced by bacteria in cases where both *RV* and bacteria cause the scours.

As *RV* is a virus, antibiotics do not treat it. However, your veterinarian may recommend treatment with an antibiotic in conjunction with supportive care if diagnostics also indicate the presence of bacteria, such as E. coli.

Prevention and control

It is not practical to try and eliminate *RV* once it is present on a farm. Therefore, we must enact procedures to reduce the effect of the virus. The most important aspect of a control program is to maintain maternal immunity and ensure that sows pass this immunity to their piglets.

If sows and gilts have good immunity prior to farrowing, protective antibodies can pass to piglets through colostrum. Antibodies are the portion of the immune system that recognize foreign substances, such as bacteria or viruses, in the body. These antibodies help protect piglets from infection during the first weeks of life.

Piglets are most susceptible to *RV* during this period and mortality is highest if an infection occurs. So, this early immunity is vital.

Producers can vaccinate or administer feedback to improve maternal immunity.

Back feeding is the process through which producers feed fecal material from young gilts and sows, combined with feces and intestinal material from

untreated scouring piglets, to sows and gilts prior to farrowing.

If your vet diagnoses your herd with *RVA*, he or she may recommend vaccination. We administer this vaccination to sows and gilts prior to farrowing. No vaccine exists for *RVB* nor *RVC*.

Your veterinarian may recommend feedback if he or she has diagnosed your herd with *RVB* or *RVC*. You can administer feedback in multiple ways; your veterinarian can help you develop a protocol for your farm.

The feedback material will contain the virus because pigs shed *RV* in feces. Consumption of contaminated feces causes a controlled infection that the animal's immune system can respond to and, like vaccination, enable the pig to develop protective antibodies against *RV*.

Feces from gilts and younger-parity sows will contain more virus than feces from older sows. The latter animals shed less virus because they have better immunity due to repetitive exposure.

Avoid giving feedback material to animals over 93 days pregnant. Sows shed *RV* in their feces after receiving feedback because it causes a controlled infection. Sows exposed late in gestation will not have enough time to clear the infection and may expose their piglets to *RV* in their feces. As well, these sows will not have enough time to develop antibodies to pass to their piglets.

Test feedback material regularly to ensure it contains enough of the virus and does not contain disease-causing bacteria. Do not leave feedback material sitting at room temperature because disease-causing bacteria will grow.

Colostrum management is the next important step in controlling *RV*. Once sows have antibodies, you must ensure that each piglet consumes colostrum to receive these antibodies from its dam.

Gilt litters are more susceptible to *RV* because gilts often produce colostrum that contains a lower concentration of antibodies than colostrum produced by older sows.

Gilt litters require extra attention to ensure that each piglet consumes a full meal of colostrum and receives enough antibodies.

Dr. Jessica Law photo

This crate is clean with no manure accumulation and the heat lamp is on to warm the creep area. Producers must manage the environment prior to farrowing to control *Rotavirus*.

By one month of age, piglets' antibody levels from colostrum will have declined and no longer provide protection. During this month, piglets' immune systems will start to generate antibodies which will provide protection once antibodies from the piglets' dams are gone.

Finally, producers must adhere to good environmental management and thorough sanitation to prevent and control *RV*. Keep the creep area at 35 C (95 F) to prevent chilling. Mortality will increase if piglets become chilled.

RV can survive in dust and feces for months. Thoroughly clean and disinfect farrowing rooms between groups of sows to decrease the amount of virus the piglets are exposed to. Remove all organic material from surfaces prior to disinfection.

After sows are loaded into crates, producers should regularly remove the animals' manure. The accumulation of manure increases the amount of virus in the environment.

If manure is present behind a sow when she farrows, piglets will be exposed to a large amount of the virus at birth. These piglets will be more likely to develop scours from *RV*.

Producers should also sanitize rooms between batches to control *RV* in early nursery pigs.

Early enactment of *RV* prevention and control measures will reduce risks to herd health and minimize negative economic consequences. **BP**

Dr. Hollyn Maloney is a veterinarian with Prairie Swine Health Services in Red Deer, Alta.

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by LILIAN SCHAER

IT'S ALL IN THE AIR: PROPER SETTINGS

Good ventilation in the barn is vital to help keep pigs healthy throughout the year.

National Pork Board, Des Moines, Iowa photo

"The more you maintain your system, the longer it will run," Dora Martinho said.

Keeping swine barn ventilation systems functioning properly can slide off the priority list when more pressing issues demand attention. But this maintenance task should not be neglected for too long; clean air and good air flow can have significant effects on pig health.

Ventilation problems can contribute to the onset of disease and exaggerate health problems present in the barn, said Dr. Christine Pelland. She's a veterinarian at South West Ontario Veterinary Services in Stratford.

The effects from ventilation problems "can be very generalized: a draft on suckling pigs could bring the onset of scours if the (animals) get chilled overnight," she said. "If there is a challenge with the air, it puts more stress on pigs' lungs and makes them less able to cope with viral and bacterial respiratory diseases like influenza, mycoplasma or porcine reproductive and respiratory syndrome virus."

Ventilation issues can also exacerbate the effects of other management problems, like pig density, out-of-feed events and high humidity levels, added Dr. Ed Metzger. He's also a veterinarian at South West Ontario Veterinary Services.

"I look at ventilation in collaboration with all other management factors when raising pigs," he explained. "Bad ventilation in and of itself could cause reduced growth, but (the issue) becomes more important as you add various disease pressures."

Good ventilation is particularly important in farrowing rooms and nurseries; the smaller and younger the pig, the less likely it can cope with stresses.

This year, too, processing delays as a result of the COVID-19 pandemic mean some producers may have heavier market-ready animals in their barns than usual, which makes good airflow extra critical.

"Adequate ventilation, feed and water for animals due to be marketed shortly is important so those pigs can deal with their added weight," Metzger said.

Most swine barns in the province could benefit from some adjustments to ensure their ventilation systems function optimally, said Dora Martinho, an agricultural engineer at South West Ontario Veterinary Services.

Typically, producers should check that settings are correct and that equipment works properly.

Ensure all fans and actuators run as they should with inlets open at the maximum level, she said.

"When we get into warmer weather, many producers forget to remove winter fan covers. The higher-stage fans are usually covered for the winter because they will not be working and producers leave the covers on for longer than they should. Producers should remove these covers when

winter is over – between mid-March and the end of the month," she said. "The settings on controllers should be appropriate to the season. For example, fans' bandwidth should be shorter in the summer to cool the barn faster as temperatures increase."

Depending on the number of ventilation stages and amount of cubic feet per minute (CFM) delivered per fan stage, producers should adjust bandwidth value settings according to the season. In the summer, this setting should be 1 F (0.6 C) and, in the winter, it should be 2 F (1.1 C).

The average estimated lifespan for fans and heaters, if properly maintained, is three to five years.

For actuators, the average lifespan is five years.

"The more you maintain your system, the longer it will run," Martinho said.

Transition seasons can be most problematic for pigs as barns often take some time to shift from cooler to warmer temperatures and vice versa. That challenge is why Pelland recommends a proactive approach to manage the inside barn environment and herd health.

"Try to be proactive and preventive. Arm yourself with the best information and resources available," she said. "Ventilation is specific to each farm and Ontario is pretty unique. We have just about every kind of barn out there, so sometimes you don't appreciate the impact that could have on the animals in the barn."

Producers can follow the best practices outlined below to solve most barn ventilation issues, Martinho said. Although these best practices are most relevant for mechanically ventilated barns, some strategies also apply to naturally ventilated barns.

1. Ensure you have the appropriate settings on your ventilation controllers.
2. Clean the fan housing and louvres frequently. Ensure fan motors run properly.
3. Clean probes frequently and ensure they work.
4. Check the backup thermostats inside rooms and ensure these thermostats are functional.
5. Verify the settings on the controllers are appropriate for the season.
6. To prepare for winter, cover higher-stage fans and unplug them.
7. Ensure heaters are serviced once a year, especially before colder seasons.
8. Review and adjust inlet settings so there is enough room for incoming air to come in and meet the animals' needs. In the winter, minimum ventilation requirements should always be met. Avoid shutting off minimum-stage fans and fully closing the inlets.
9. Ensure good ventilation in your barn. Do not underventilate, which will affect the air quality in the barn and consequently the animals' health. But do not overventilate; having more air than required flowing through the room or barn will cause younger animals to become chilled, especially in farrowing rooms and nurseries. Also, if the room is overventilated, the heater will run more often in the colder seasons to keep the room at the desired temperature. This situation will increase energy costs.
10. Minimize drafts by sealing gaps around fans, doors and windows.
11. Stay current with industry requirements and the correct settings for your system and your barn.

"Requirements will (shift) as the industry evolves, farm productivity changes and we continue to have a stronger lens on ensuring proper animal welfare," Metzger said. "This would include ventilation, but also other management aspects like space allowances, adequate feeder space, eliminating out-of-feed events and reducing in-barn humidity." **BP**

Swine Health Ontario is a leadership team focused on improving and coordinating the industry's ability to prevent, prepare for and respond to serious swine health threats in the province.

COST CONSIDERATIONS FOR SOW EXERCISE

As we prepare for the upcoming sow housing requirements, researchers study the associated costs.

National Pork Board, Des Moines, Iowa photo

Overall, a direct relationship exists between the cost of conversion to group sow housing and payback regardless of labour rate.

As of July 1, 2024, all mated gilts and sows must be housed in groups or individual pens, the Canadian Code of Practice for the Care and Handling of Pigs states. Producers can house mated gilts and sows in existing stall barns if they have the opportunity to turn around or exercise periodically or other means that allow a greater freedom of movement.

Currently, we lack scientific evidence on which to base a recommendation on what constitutes acceptable greater freedom of movement for stall-housed sows. Additionally, we don't know if periodically providing stall-housed sows with opportunities for greater freedom of movement will benefit sow welfare and productivity. This research project aimed to address knowledge gaps to support informed decision-making. Research questions focused on understanding:

1. How motivated are sows to receive time out of their stalls?
2. How is the motivation of restricted-fed sows to exit their stalls shaped by diets that influence hunger?
3. Does providing a low level of exercise (10 minutes/week) benefit the welfare and productivity of stall-housed gestating sows?

Results

1. The motivation of sows and gilts to exit their stalls

Researchers trained stall-housed sows to associate pushing one of two buttons on an operant panel to request access to rewards.

Sows received time out of their stalls (movement) when they pushed one of the buttons, and a small feed reward (food) when they pushed the other button.

Both sows and gilts showed a level of motivation to exit the stalls, as indicated by how hard the animals "worked," as measured by the highest price paid (HPP) or the total number of button presses to obtain a reward. See Figure 1 on page 37.

However, sows displayed greater motivation to access feed rewards than to exit the stalls. This greater motivation for feed may result from sows recovering from lactation at the time of testing. Gilts' motivation to access feed was significantly lower than sows' motivation.

No difference existed between sows and gilts' level of motivation to exit the stalls.

That gilts showed an equal level of motivation to receive feed as to exit the stalls may indicate that gilts, which were stall-naive at the start of the trial, value opportunities for each reward equally.

2. The influence of high-fibre feed on the motivation of sows to exit their stalls

Researchers trained sows to use the operant panel to access time out of their stalls. Technicians fed sows one of three diets designed to influence hunger levels.

Providing ad-libitum high-fibre feed in addition to the standard gestation ration reduces the motivation of sows to exit their stalls, results suggest. See Figure 2 below. Sows' desire to seek additional feed may influence their motivation to exit their stalls, this finding implies.

However, whether fed a high-fibre feed at 50 per cent of their ad-libitum, or full ad-libitum intake level, sows still interacted with the operant panel. This continued interaction may suggest that the panel also provides an enrichment for exploration. That sows fed additional high-fibre feed worked to a moderate HPP to exit the stalls may also suggest an intrinsic level of motivation remains for sows to access time out of the stalls.

Scientists still need to analyze sow behaviour when outside of the stalls. This research will support a better understanding of what may motivate sows to exit the stalls.

3. Low-level exercise on the productivity of stall-housed gestating sows

Providing stall-housed gestating sows with 10 minutes of exercise once per week benefited only the performance of older-parity sows, results indicate.

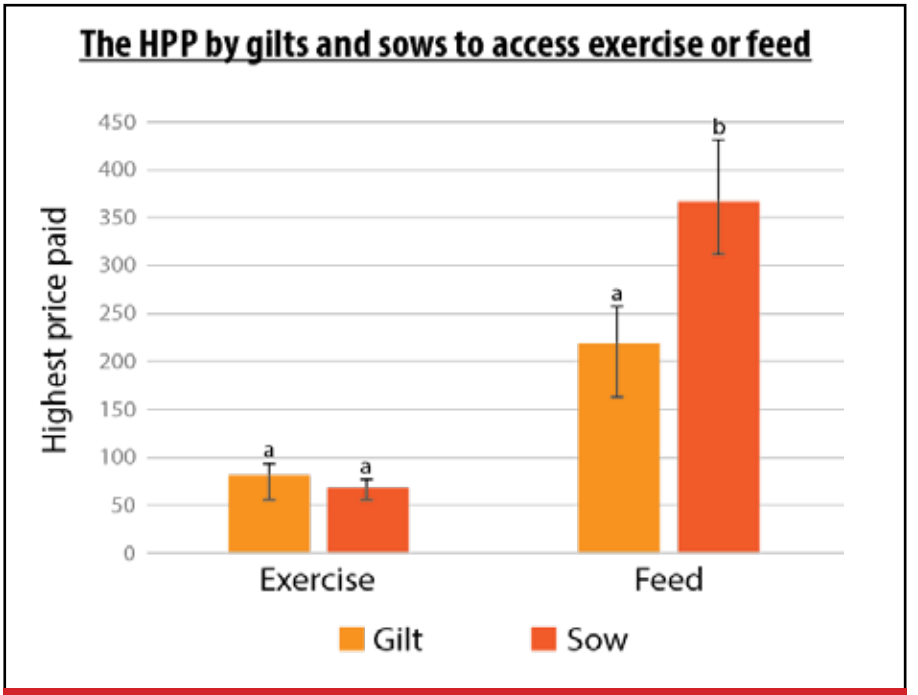
We did not see measurable benefits from exercise in younger sows. These animals tend to be in better physiological condition.

Older-parity sows that were group-housed, or stall-housed with weekly exercise, had a greater number of liveborn piglets compared to sows housed in stalls throughout gestation. See Figure 3 on page 38.

Additionally, stall-housed older-parity sows had a greater number of stillborns than sows that were stall-housed and received weekly exercise, or group-housed, over the course of gestation. See Figure 4 on page 38.

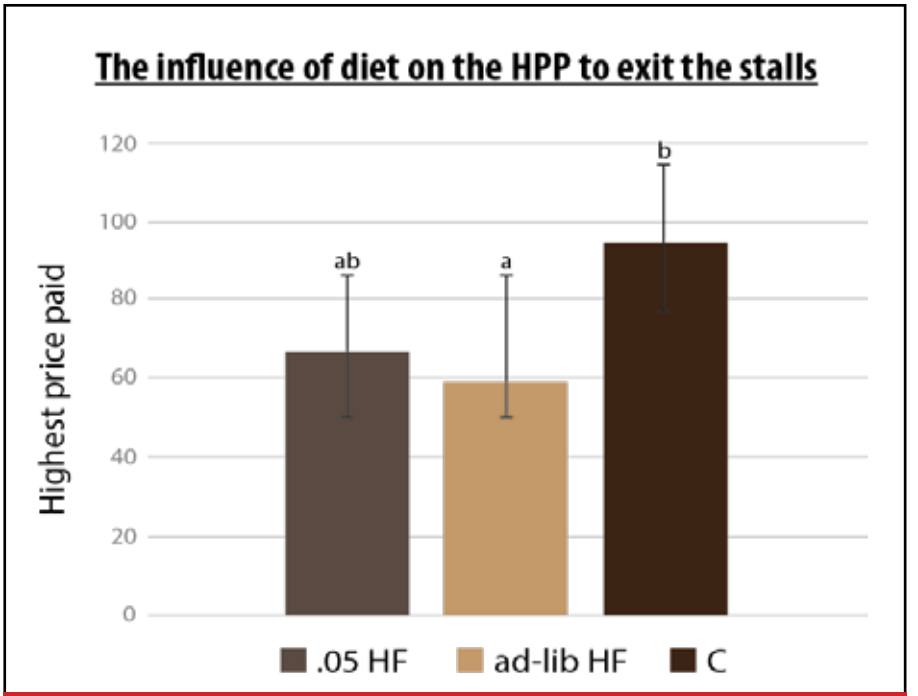
Researchers have yet to analyze

Figure 1



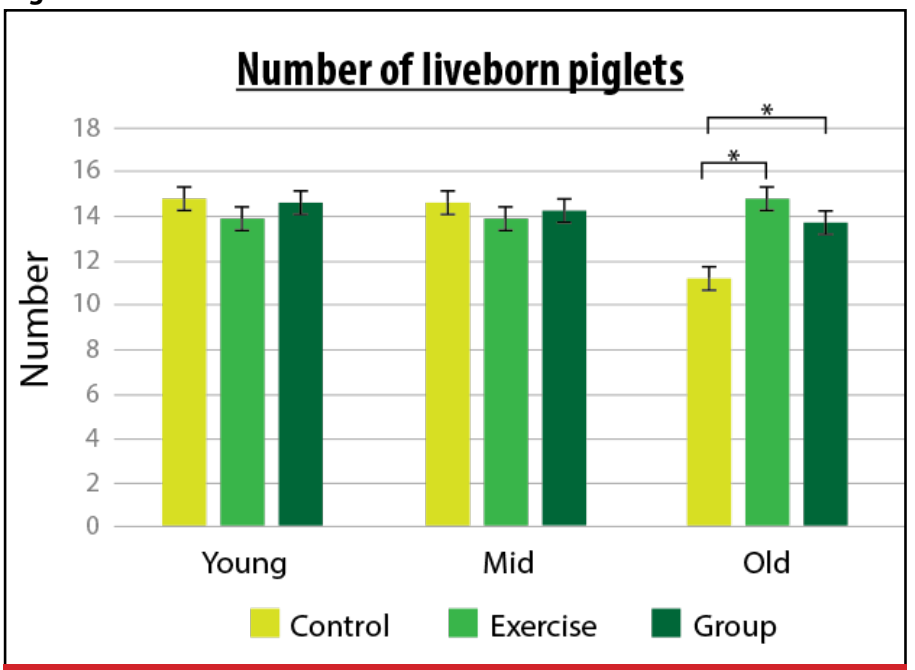
This graph shows the highest price paid (mean ± SEM) for sows (n =12) or gilts (n = 12) to access time out of the stall or a feed reward. Where superscripts differ, P<0.05.

Figure 2



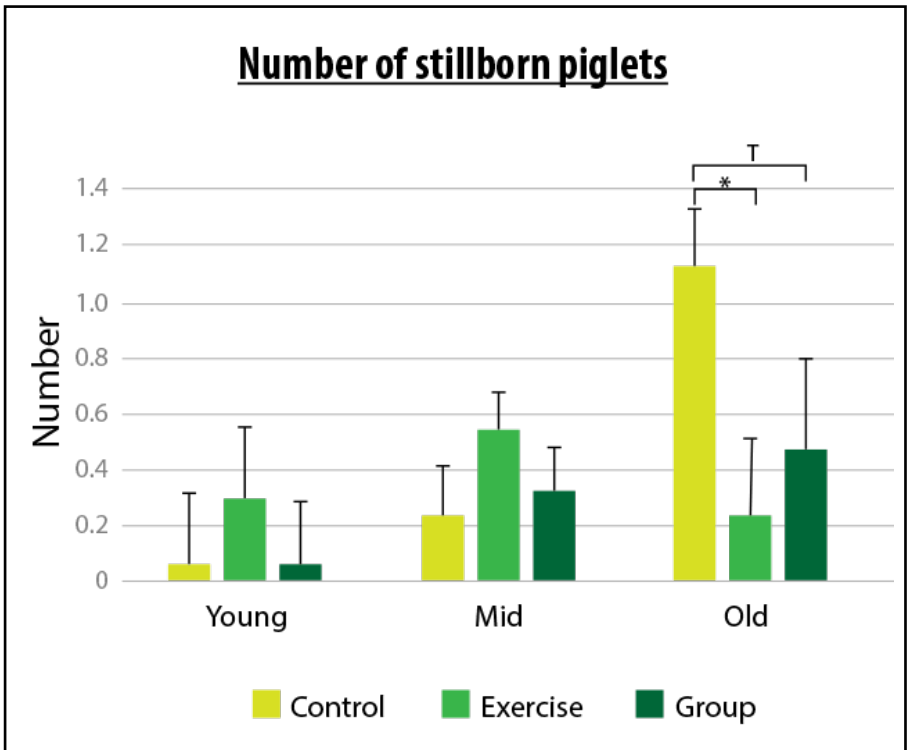
This graph shows the highest price paid (HPP) for sows tested for their motivation to exit the stalls for exercise when provided with one of three diets: their standard gestation ration (Control, C, n = 14), half of their ad-libitum daily high-fibre feed intake in addition to their gestation ration (0.5 HF, n = 14), and ad-libitum access to a high-fibre feed in addition to their gestation ration (ad-lib, n =14), (mean ± SEM). Where superscripts differ, P<0.05.

Figure 3



This graph shows the number of liveborn piglets (mean ± SEM) for sows belonging to young (parity 0-1, n = 49), mid- (parity 2-4, n = 95), and old- (parity 5-7, n = 24) parity groups from control, exercise and group treatments. Brackets connect treatments with significant differences. * P <0.05.

Figure 4



This graph shows the number of stillborn piglets (mean ± SEM) for sows belonging to young- (parity 0-1, n= 49), mid- (parity 2-4, n = 95), and old- (parity 5-7, n =24) parity groups from control, exercise, and group treatments. Brackets connect treatments with significant differences. * P <0.05; T: Tendency, P = 0.08.

measures of sow behaviour, physiology and the gestational stress of the sow and her piglets. Considered together, the results will provide comprehensive information on how periodic exercise influences sow welfare and productivity.

Economic assessment

If producers decide to exercise their sows and keep stall-based systems, at what point does it pay to convert to group sow housing?

This decision is farm dependent and shaped by several factors, including the availability and cost of labour and expected renovation cost. If producers provide sows 10 minutes of exercise, once per week, we will also see an increase in performance (two pigs per litter) in older-parity sows, results indicate.

Taking these factors into account, we can estimate a payback in converting to group sow housing.

In Table 1 on page 39, we estimate the increase in total productivity, additional labour requirements and the cost associated with exercising sows in a 1,200-sow operation.

Assuming parity 5+ sows have greater productivity with exercise (two pigs per litter), and represent 26.5 per cent of the herd, this operation would produce an estimated additional 1,282 pigs annually.

However, this calculation must be offset by the additional labour required for sow exercise. Based on a labour requirement of 10 minutes/sow/week, this facility would require an additional four people to ensure all gestating sows receive the appropriate amount of exercise.

Assuming a labour rate of $15 per hour, we would need to spend an additional $2,450 per week or $127,400 annually on sow exercise.

The overall effect on the operation would be an increase in the cost of production of $2.00/hog marketed. The additional labour for sow exercise adds $2.94/hog in cost, but the increase in production reduces fixed costs by $0.94/hog.

In Figure 5 on page 39, we examine the costs associated with sow exercise and the effects on spend-

ing that money to convert to group housing. By examining different costs of conversion and labour rates, we can identify trends.

Overall, a direct relationship exists between the cost of conversion to group sow housing and payback regardless of labour rate.

In other words, as the conversion process becomes cheaper, the payback to investment increases, which would encourage producers to transition to group housing sooner. The quicker the payback, the more incentive producers have to spend money on their facilities rather than on additional labour.

An inverse relationship exists between payback (in years) to group sow housing and the cost of labour ($/hour). As the labour rate increases, producers will need to spend more money on labour to accomplish the same task (sow exercise) in a stall-based system.

Based on information in Table 1, if we increased the labour rate from $15 to $30 per hour, our total labour expense for the year would double. The figure would increase by an additional $127,400.

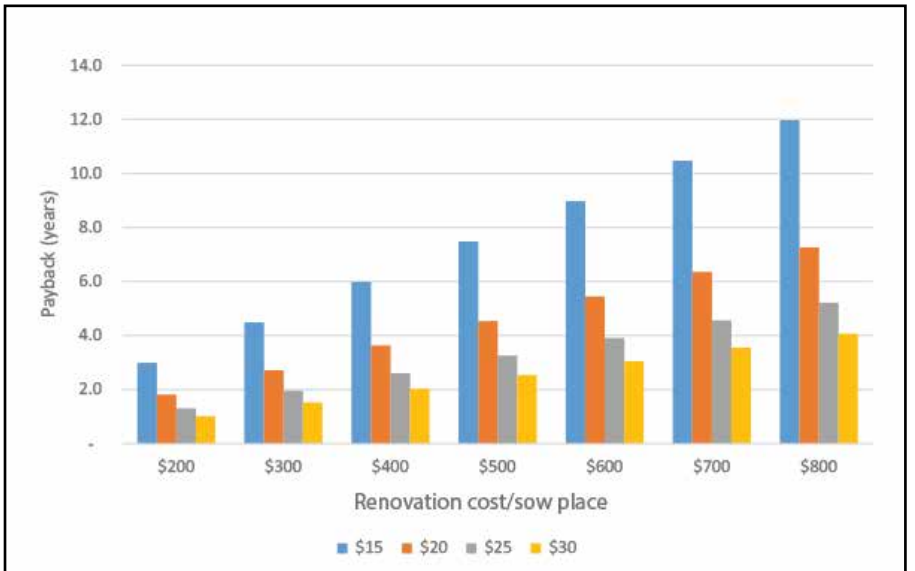
Looking at the example in Figure 5, if we assume the cost of conversion to group sow housing is $500 per sow place, payback improves from 7.5 years to 2.5 years when labour rates increase from $15/hour to $30/hour, respectively. This figure equates to a three-fold increase in payback when labour rates double.

As labour rates increase and renovation costs decrease, producers should seriously consider reinvesting in their operations. At some point, money spent on additional labour may be better reinvested in your facility. While each situation is unique, producers must calculate their individual paybacks and consider where to spend their money.

Table 1: Sow exercise – productivity effect

Parity 5+ (%)	26.5% of sow herd
Parity affected (5+)	318 sows
Pigs sold/sow	4.03 per year
Total pigs sold	1,282 per year
Farrowing crates required	55 per week
Sows requiring exercise	980 per week
Total time required	163.3 hours/week
Additional staff required	4.1
Labour cost	$15 per hour
Total labour cost for exercising	$2,450 per week
Total labour cost for exercising	$127,400 per year

Figure 5: Payback on the conversion to group housing



This graph shows the effect of labour rate ($/hour) and renovation cost ($/sow place) on payback (time) required to convert to group sow housing.

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Mariia Tokareva is a graduate student in the department of large animal clinical sciences at the University of Saskatchewan (USask). She works with Dr. Yolande Seddon.

Seddon is an adjunct research scientist of ethology at Prairie Swine Centre (PSC) and an assistant professor in the department of large animal clinical sciences at USask.

Ken Engele is the manager of knowledge transfer at PSC.

by
DREW
WOODS

DIGITAL TOOLS CAN HELP WITH DECISIONS

As we navigate these challenging times, let's use data to help us find the best path forward.

Many swine industry leaders are sharing information on how producers can best minimize the effects of the COVID-19 pandemic on their operations by altering their nutrition programs and management strategies. What these discussions generally lack, however, is information on how to quantify the effects of these decisions and how they affect nutrition, pig flows, and profitability.

Producers can use digital tools such as benchmarking systems, biological models and economic models to integrate a range of information. Then, producers can chart a path to balance all aspects of their operations.

We commonly use benchmarking tools in the swine industry. Producers can apply insights gleaned from these resources to make decisions in the face of market changes.

As the saying goes, "you can't manage what you don't measure." But, in order to compile the most useful information, we also need to remember to "compare apples to apples."

We can use benchmarking systems to help us do this work by filtering information by production type, genetics, location, etc. We can also use these tools to standardize data – like start and end weights, technical results and economics – to ensure we make proper comparisons.

In Figure 1 below, for example, we can review five years' worth of benchmarking results from conventional market hogs in Quebec. In

Figure 1: Key performance indicators of conventional market hogs in Quebec, 2015-19

Year	Class Index	Days Average	Start Weight (kg)	Number of Pigs Sold	Mortality (%)	Carcass Weight (kg)	Feed (kg/pig)	Feed/ Gain	F/G (25-125)	ADG (g/d)	ADFI (kg/d)	Potential Margin ($/pig)
2015	111.08	114.54	26.99	1,094,728	3.84	102.85	276.38	2.75	2.70	881	2.41	14.22
2016	111.02	113.84	28.05	1,102,527	3.90	104.02	276.37	2.74	2.66	889	2.43	15.55
2017	110.91	112.86	27.67	1,090,460	3.91	104.52	274.95	2.70	2.62	907	2.44	17.08
2018	111.05	114.00	27.36	1,083,929	3.95	104.87	279.49	2.73	2.64	904	2.45	16.41
2019	111.16	116.32	26.92	771,001	4.06	105.75	284.23	2.73	2.64	899	2.44	16.31
Average	111.04	114.19	27.43	5,142,645	3.92	104.32	277.91	2.73	2.65	896	2.43	15.89

Although the hogs' start and end weights are different, we have standardized the feed conversion as well as the financial output to enable a clear comparison of results.

Figure 2: Shipping, carcass and economic performance

Wk	Date	Pigs	%	Farm Gate Weight (kg)	S.D. (kg)	ADG (g)	ADFI (kg/d)	F/G	Carcass FG	Hot CW (kg)	Dressing (%)	Lean Yield (%)	Backfat (mm)	Loin Depth (mm)	Index	Feed Cost ($)	Cost /Kg ($/kg)	MOFC ($)	Net Profit ($)
13	03 Apr	90	4.6	130.77	5.02	1,136	3.14	2.76	3.34	105.36	80.6	60.9	18.7	67.8	94.1	61.83	0.626	77.09	77.09
14	10 Apr	270	13.8	129.96	3.56	1,060	2.87	2.71	3.31	104.03	80.1	61.3	17.9	68.5	98.7	63.91	0.641	80.20	80.20
15	17 Apr	360	18.4	130.29	3.80	1,003	2.62	2.61	3.22	103.82	79.7	61.5	17.4	68.3	98.1	64.18	0.634	78.64	78.64
16	24 Apr	360	18.4	129.49	3.80	948	2.55	2.69	3.31	103.37	79.8	61.4	17.7	68.5	99.9	68.73	0.671	76.14	76.14
17	01 May	360	18.4	128.55	3.43	898	2.43	2.71	3.36	102.39	79.7	61.4	17.7	68.2	102.5	71.23	0.690	76.27	76.27
18	08 May	520	26.4	123.50	6.97	823	2.25	2.74	3.42	97.95	79.3	61.8	16.7	66.9	106.7	71.48	0.712	75.40	75.40
Average				128.00	5.56	940	2.54	2.70	3.33	102.02	79.7	61.5	17.5	67.9	101.4	68.10	0.672	77.03	77.03

In total, 1,960 pigs were marketed and there were 40 mortalities. The pigs were 172 days of age at slaughter. By reviewing this type of model data, producers can see the effects of their selections for shipments, as well as the effects of animal age and weekly market conditions, on farm revenues.

Figure 3: Pig barn management scenario modelling

	Base Scenario			Alt. Scenario 1			Alt. Scenario 2			Alt. Scenario 3		
Capacity	2,000.00			2,000.00			2,000.00			2,000.00		
Entry weight (kg)	27.00			27.00			27.00			27.00		
Exit weight (kg)	131.50			131.50			131.10			130.10		
Average days (days)	108.40			110.70			110.70			117.80		
Average gain (g/d)	964.02			943.99			940.38			875.21		
Feed/gain	2.75			2.78			2.80			2.90		
Turns/year	2.78			2.73			2.73			2.59		
Total mortality (%)	2.00			2.25			2.50			3.00		
Average carcass index	109.50			109.30			109.30			109.30		
# pigs out	5,445.00			5,337.00			5,324.00			5,029.00		
	Total	**$/Pig**	**$/100kg**	**Total**	**$/Pig**	**$/100kg**	**Total**	**$/Pig**	**$/100kg**	**Total**	**$/Pig**	**$/100kg**
REVENUES/INCOMES												
Revenue-hog-finisher unit	$909,478	$167.03	$158.77	$892,172	$166.73	$158.49	$889,443	$166.22	$158.49	$838,111	$164.95	$158.48
TOTAL REVENUES/INCOMES	**$909,478**	**$167.03**	**$158.77**	**$892,172**	**$167.17**	**$158.90**	**$889,443**	**$167.06**	**$159.29**	**$838,111**	**$166.66**	**$160.12**
OPERATING EXPENSES												
COST OF SALES												
Buying feeder pigs	$182,737	$33.56	$31.90	$179,579	$33.56	$31.90	$179,579	$33.56	$32.00	$170,535	$33.56	$32.25
G-F pig feeds	$420,027	$77.14	$73.33	$418,341	$78.18	$74.32	$420,161	$78.52	$74.87	$407,903	$80.28	$77.13
TOTAL G-F pig feeds	$420,027	$77.14	$73.33	$418,341	$78.39	$74.51	$420,161	$78.92	$75.25	$407,903	$81.11	$77.93
Medication	$11,434.50	$2.10	$2.00	$11,237.10	$2.10	$2.00	$11,237.10	$2.10	$2.00	$10,670.10	$2.10	$2.02
TOTAL COST OF SALES	**$614,199**	**$112.80**	**$107.22**	**$609,158**	**$114.14**	**$108.50**	**$610,977**	**$114.76**	**$109.42**	**$589,107**	**$117.14**	**$112.55**
OTHER VARIABLE EXPENSES												
Transport cost out	$32,670.00	$6.00	$5.70	$32,106.00	$6.00	$5.70	$32,106.00	$6.00	$5.72	$30,486.00	$6.00	$5.76
Equipment maintenance and repair	$11,706.75	$2.15	$2.04	$11,504.65	$2.16	$2.05	$11,504.65	$2.16	$2.06	$10,924.15	$2.17	$2.09
Miscellaneous variable	$1,089.00	$0.20	$0.19	$1,070.20	$0.20	$0.19	$1,070.20	$0.20	$0.19	$1,016.20	$0.20	$0.19
TOTAL OTHER VARIABLE EXPENSES	**$45,465.75**	**$8.35**	**$7.94**	**$44,680.85**	**$8.37**	**$7.96**	**$44,680.85**	**$8.39**	**$8.00**	**$42,426.35**	**$8.44**	**$8.11**
FIXED COSTS												
Electricity	$11,597.85	$2.13	$2.02	$11,397.63	$2.14	$2.03	$11,397.63	$2.14	$2.04	$10,822.53	$2.15	$2.07
Taxes (net)	$7,840.80	$1.44	$1.37	$7,705.44	$1.44	$1.37	$7,705.44	$1.44	$1.37	$7,316.64	$1.44	$1.38
Miscellaneous fixed	$59,895.00	$11.00	$10.46	$58,861.00	$11.03	$10.48	$58,861.00	$11.06	$10.54	$55,891.00	$11.11	$10.68
TOTAL FIXED COSTS	**$79,333.65**	**$14.57**	**$13.85**	**$77,964.07**	**$14.61**	**$13.89**	**$77,964.07**	**$14.64**	**$13.96**	**$74,030.17**	**$14.72**	**$14.14**
TOTAL OPERATING EXPENSES	**$738,998**	**$135.72**	**$129.01**	**$731,803**	**$137.12**	**$130.34**	**$733,622**	**$137.80**	**$131.38**	**$705,564**	**$140.30**	**$134.80**
TOTAL PROFIT BEFORE TAX	**$170,480**	**$31.31**	**$29.76**	**$160,370**	**$30.05**	**$28.56**	**$155,821**	**$29.27**	**$27.91**	**$132,547**	**$26.36**	**$25.32**

Producers can use models and economic tools to compare alternative scenarios and select the best option for their operations. In this model, for example, the base scenario equates to an extra $4.95 of profit before tax per pig compared to alternative scenario three.

this case, the animals' start and end weights are different as they are unique inputs. However, we have standardized the feed conversion as well as the financial output to enable a clear comparison of results.

By employing these data-analysis strategies, we can "harvest" information from previous down markets or supply interruptions to understand the effects on the businesses' finances and how to appropriately mitigate risk.

We can also use benchmarking to see how our decisions stack up against the decisions of other producers in similar situations.

Although it is difficult to make real-time comparisons, we can use benchmarking to learn from current events and create effective plans to mitigate future challenges.

We can use models to help answer complex questions and evaluate potential solutions to problems. So, let's discuss how we can use models to decide which nutritional or management strategy is the best option as we navigate through supply chain interruptions and keep pigs on farm longer as a result of the COVID-19 crisis.

For example, producers can apply a multitude of suggested methods to either slow pig growth or reduce the cost of feeding pigs for longer than usual. We can use a model to help validate which solution(s) are best for each producer. Before enacting any changes to your feed program, consult your swine nutritionist.

For a producer who mixes feed on-farm and has a high volume of lower-energy fibre ingredients like wheat, barley or wheat byproduct, the ability to lower feed energy, add bulk and slow growth is likely. A lower-energy diet alone, however, is not necessarily enough to get the job done. The producer must also take protein quality and quantity into account.

When the feed program is balanced appropriately, we can see a definite reduction in growth, which helps producers during down times in marketing.

Figure 2 on page 40 shows an example of a model that summarizes all technical and financial outputs based on the shipments of pigs to market. Producers can review such reports to see the effects of their selections for shipments, as well as the effects of animal age and weekly market conditions, on farm revenues.

bullstar69/iStock/Getty Images Plus photo

Producers can use digital tools such as benchmarking systems, biological models and economic models to integrate a range of information. Then, producers can chart a path to balance all aspects of their operations.

This spring, producers faced many breakdowns in the usually smooth process of sending pigs to packers. Although the swine industry can do little to overcome a shutdown at a packing plant, we can show the effects of the shutdown on the herd and how shipments may look when they can resume.

We can use models to predict or replicate producers' shipping patterns. Then, we can use this information to determine not only the economic outcome of delaying animals but also the physical effects of holding them back.

We can analyze this information alongside the outcomes of nutritional interventions to determine where the two practices could cause more harm than good.

Holding pigs back from slaughter could create a space restriction within the facilities where they are housed. Larger pigs increase the likelihood of less space per animal as well as reduced access to feed and water. Diluting pigs' diets can exacerbate behavioural vices.

By using models, we can see what solutions will work together as part of a full program to enable the best outcome possible for the producer.

Finally, with economic models or scenario analysis programs, we can also examine the possible financial implications of a revised nutrition or herd management program. For example, if we have three potential solutions to apply on-farm, we can run them through a model to determine the most financially viable option.

Figure 3 on page 41, for example, shows the output from multiple what-if scenarios and their economic effects. By reviewing such information, producers can gain a more complete understanding of the potential implications of each possible program. Particularly under current market conditions, producers need all the data they can gather to make informed decisions.

By fully integrating the standardized data into our modelling, we can find the best solution to overcome the challenges we face while also accounting for the biological responses of the animals and the economic effects on our operations. **BP**

Drew Woods has worked for 11 years at Trouw Nutrition Canada as a swine nutritionist and now as a NutriOpt Swine Specialist. He works closely with producers and swine operations across Canada, providing him with vast field experience. He holds a B.Sc. in animal science and an M.Sc. in animal nutrition from the University of Guelph in Ontario.

Ontario
Pork News & Views
Prepared and Edited by the OMAFRA Swine Advisory Team
ONTARIO PORK
August 2020

Ontario Pork Congress

OPC has gone virtual for 2020. The online version of the 47th annual trade show normally held in Stratford, Ontario will be available until the end of this year. You can visit at this link: www.porkcongess.on.ca. As always OMAFRA has a booth with information and resources for producers. We hope to 'see' you there.

How to Avoid Production Losses in Swine Due to Heat Stress

INTRODUCTION

The issue of heat stress continues to be a concern each summer. Long hot humid days in summer can result in heat stress issues in pig operations. A study released by Ohio State University in 2003 concluded that heat stress costs the US pork industry approximately $300 million each year1.

Although pigs are generally raised in facilities with a controlled environment, it is not always possible to avoid high temperatures within the barns. Temperatures above 23°C can have negative impacts on animal performance. From an animal welfare and good business standpoint, measures should be taken to help reduce the impact of hot weather on pigs. In extreme cases, heat stress in pigs can lead to death loss.

WHEN AND HOW DOES HEAT STRESS OCCUR?

Heat stress occurs when the environmental temperature rises to a point where the animal is producing more heat from metabolism, or receiving more heat from its surroundings, than it is transferring from its body to its environment.

Heat stress is a concern with pigs because they do not have functional sweat glands to help them reduce body heat. They lose heat to their surrounding environment by conduction, thermal radiation, convection and evaporation to maintain their ideal core body temperature. If temperature and relative humidity are too high, pigs can no longer maintain their ideal body temperature.

Figure 1 shows a Heat Stress Index for grow-finish pigs determined by temperature and relative humidity. This can be used to assess the risk to animals under various conditions.

Under heat stress conditions, the goal is to minimize heat transfer to the animal from the surroundings and maximize heat transfer from the animal to its environment. Recognizing the potential for heat stress, or that pigs are experiencing heat stress, is the first step in helping the animals cope with a hot, humid environment.

SIGNS OF HEAT STRESS

- Evident discomfort or distress; pigs lying apart, body stretched out.
- Manure patterns change; pen floors become wet and unclean.
- Increased water consumption.
- Noticeable decrease in pen activity; slowness and lethargy.
- Muscle trembling.
- Rapid fall in feed consumption with reduced weight gains.
- Very high respiration rate (panting).

COPING WITH HEAT STRESS

Pigs will try to increase heat dissipation and decrease body heat production. Producers can aid this in the following ways:

- Make sure pigs have unrestricted access to a good supply of clean water.
- Install a timed water sprinkler or mister system triggered by room temperature for group housed pigs (sows, grow-finish). Sprinklers should activate for 1–2 minutes every 20–30 minutes to allow moisture to evaporate from the

New OMAFRA Staff Announcement

Michelle Linington is the new Feed Ingredient and ByProduct Specialist with OMAFRA. She has worked in the agriculture industry for the past 6 years, with majority of her time spent on extension and KTT work.

Michelle has spent the last several years working for Holstein Canada as an Extension and Education Specialist. She has a Bachelor of Agriculture Science and a Masters of Science from the University of Guelph where most of her studies were focused in animal agriculture and adult education. Michelle will be spending time working on several projects including the use of Switchgrass in dairy facilities, alternative feeds for milking robots and is looking forward to developing projects in other species including swine. Michelle will be based out of the Guelph office at 1 Stone Road West. You can reach Michelle at michelle.linington@ontario.ca or by calling 226 228 0219.

pigs' skin before starting the process again. Larger water droplets also work better than a fine mist.
- Install a drip cooling system or sow cooling pads for individually housed sows.
- Ensure proper ventilation rates for the size of room and the weight of the pigs (Table 1).
- Do not overcrowd pigs. Provide enough pen space so that all the pigs can lie down without touching each other and still access feeders, waterers and the dunging area without stepping on pen mates.
- Work with your nutritionist to reformulate more nutrient dense diets during hot weather.
- When pigs are fed at set time points, alter the time of day in which the bulk of feed is offered. By providing the majority of feed during cooler hours, it will help to reduce decreases in feed intake.

It is important to recognize when temperature and humidity can increase the risk heat stress in pigs. By recognizing when pigs are experiencing heat stress, and knowing how to help them cope, we can prevent or reduce production losses during periods of hot weather.

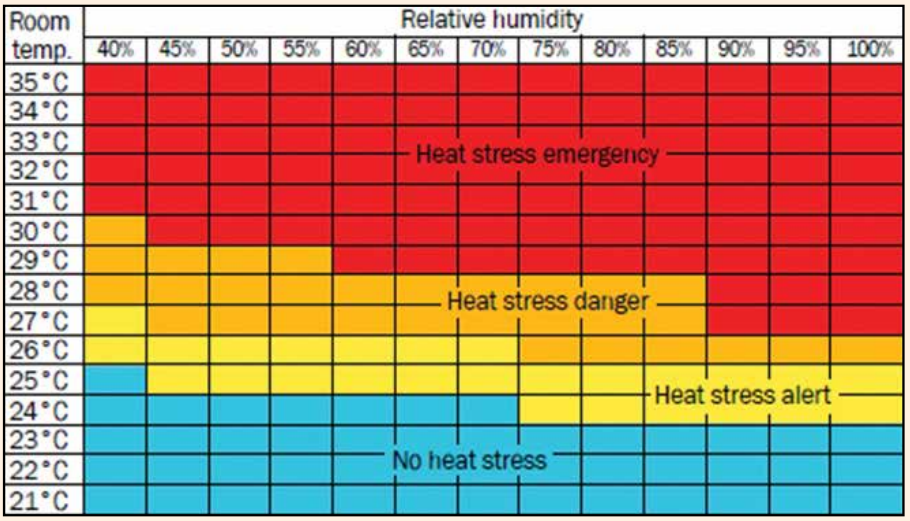


Figure 1: Heat Stress Index for Grow-Finish Pigs[2]

BE PREPARED

The weather cannot be controlled. Plan ahead and have strategies in place to deal with hot weather when it happens.

Death loss due to heat stress is most often attributed to power outages in hog barns when there is no alternate power source or power loss back-up plan. Test your alternate power generation and power outage alarms monthly for fan operated barns (static pressure barns). Check panic doors/drop curtain releases for naturally ventilated barns. Heat build-up in non-ventilated barns can cause fatalities in all seasons.

TRANSPORTATION

Transport during any season can cause heat stress in pigs and may result in death loss. When possible try to:
- Load animals in groups of less than five.
- Adjust transport to early morning or at night during the summer.
- Load fewer pigs per load on hot, humid days4.
- Provide wet shavings when the temperature is over 15°C; do not use straw.
- When the temperature is over 27°C, mist or spray pigs with water prior to loading.
- Do not pour large amounts of cold water onto an overheated pig.
- Load and unload promptly to avoid heat buildup.

Table 1: OMAFRA Recommended Ventilation Rates[3]

Type of Animal	Ventilation Rate CFM/Animal	
	Cold Weather	Warm Weather[a]
Breeding/Gestating Sow	10	200
Farrowing Sow with Litter	15	400
Nursery Pigs, 4-25 kg	1.0-3.0[b]	15-35[c]
Grower Pigs, 25-60 kg	4.0-6.0	50-70
Finishing Pigs, 60-20 kg	6.0-8.0	70-90

[a]Summer ventilation rate for large pigs may need to be increased to 1 air change per minute during hot summer weather
[b]For reasonably good air quality, this minimum winter ventilation rate may need to be increased to ensure at least 3–4 room air changes per hour
[c]Limit the maximum summer air changes to 1 per minute for sensitive livestock

ACKNOWLEDGEMENTS

University of Minnesota PorkBridge Educational Series
National Pork Board TQA program

[1]See: St-Pierre N.R., B. Cobanov and G. Schnitkey. 2003. Economic Losses from Heat Stress by US Livestock Industries. J. Dairy Sci. 86:E52-E77
[2] Adapted from Xin, H. and J. Harmon. 1998. Livestock Industry Facilities and Environment: Heat Stress Indices for Livestock. Iowa State University.
[3] From Ventilation for Livestock and Poultry Facilities Pub 833, OMAFRA.
[4]See: Transport Loading Densities Guidelines at www.ontariopork.on.ca under "Resources-Transportation".

Cost of production – using it, planning with it.

You will have at some point heard or read that knowing your cost of production (COP) is important to understanding and managing your business. Some are more convinced than others of the value of knowing your COP. COP is another tool available to help make farm decisions and as with any tool it needs to be useful to you to invest the time in calculating it. So beyond just knowing your COP, it needs to be used in helping you make farm decisions.

The first challenge with COP is coming up with it. Most farms have multiple enterprises that make allocating the individual costs to each enterprise a challenge. Accounting packages are making it easier to track COP by enterprise with the ability to allocate income and expenses as they entered. Once you have your COP as the base, you can run what if scenarios on the impacts of changing production performance, market prices and costs. Based on the impacts of these changes you can plan for ways to minimize the negative effects and optimize the positive ones.
The Ontario Enterprise Budgets are planning tools that can help start putting your COP to work for you. There are 75 Excel-based crop and livestock budgeting tools including 6 swine enterprises available for download; Farrow-To-Feeder, Farrow-To-Finish, Farrow-To-Wean, Grower Finisher, Nursery and Wean-To-Finish. The figures included in the swine budgets are based on the 2019 average of the Monthly Swine Budgets updated by the OMAFRA Swine Team. They provide a guide and a framework to calculate your COP. The most important and relevant figures are your own.

The tools take a production systems approach where the production factors and practices of the enterprise are detailed out and input prices

Figure 1: Production System - Swine Farrow to Finish

Number of Sows	300	Litters/Sow/Year	2.35
Number of Boars	0	% Farrowing Rate	91
Litters per Year	705	Litters per Week	13.6
Days Nursing per Litter	21	Crates Required	54.1
Days Crate Used/Farrowing	28	Pigs Weaned per Litter	11.0
Days to Rebreed	7	Pigs Weaned per Year	7755
Pigs Born Alive per Litter	12.5	Pigs Weaned/Crate/Year	143.4
% Pre-Weaning Survival Rate	88	Feeder Pigs per Litter	10.6
% Weaning Survival Rate	96	Feeder Pigs per Year	7445
% Finishing Survival Rate	94	Feeder Pigs/Sow/Year	24.8
Days Pig in Weaner Barn	56		
Expected Feeder Weight - kg	27	Market Pig Production Capacity	7532
		Market Pigs Produced	6998
Finishing Barn Capacity -hd	2600	Market Pigs/Sow/Year	23.3
Days Pig in Finishing Barn	112		
Days for Turn Around	14	Days to Feeder Weight	77
Expected Market Weight - kg	129.54	Days to Market Weight	189
Expected Carcass Weight - kg	103.63	Kg Feeder Pig Produced	201010
Expected Market Index	110	Kg Pork Produced	725203
Premium - $/hd	2.00		
Percent of base formula - %	101		
Daily Feed Requirements:		Feed Required/Year (tonnes):	
Dry sow - kg/sow/day	1.726	Dry sow	154.93
Nursing sow - kg/sow/day	4.1	Nursing sow	80.93
Boar - kg/boar/day	2.5	Boar	0.00
Lifetime Feed Requirements:	kg/pig		
Nursery # 1	1.78	Nursery # 1	13.80
Nursery # 2	7.22	Nursery # 2	55.99
Nursery # 3	24.5	Nursery # 3	190.00
Grow-Finish # 1	49	Grow-Finish # 1	342.90
Grow-Finish # 2	89	Grow-Finish # 2	622.82
Grow-Finish # 3	144	Grow-Finish # 3	1007.71
		Feed Conversion -feed/gain:	
		Market Hogs	2.75

Figure 2. Risk Factors:		Optimistic	Expected	Pessimistic
Market Pig Price	$/kg carcass weight	2.36	1.61	1.40
Replacement Gilts ($/gilt)	$/gilt	360	306	298
Breeding Boars	$/boar	530	520	350
Cull Sows	$/sow	280	157	110
Cull Boars	$/boar	250	200	140
Market Hogs Sold/Yr		7150	7532	6800

What would be a normal plus/minus range for feed costs : 20 % of Expected

applied to arrive at a total cost by expense line. From a planning perspective these are useful because the amounts used and prices paid are detailed out so changes to rations or input prices or market prices can be made and the impact on the financials can be quickly seen. Figure 1 is an example of the production system information from the Farrow to Finish budget that 'paints' the production picture of your farm operation. The grey cells/blue text on the left can be changed to reflect your farm operation and based on those entries the values on the right report the production performance. Not surprisingly, production drives cost of production so monitoring these factors are key to managing your costs.

With your COP by enterprise you can start to concentrate on individual or groups of costs that affect it. For swine farms, like most livestock enterprises, feed costs represent a large percent of the costs, so management time focused on feed costs is time well spent. For swine finishing operations, livestock purchases and feed costs will be in the range of 80-90% of total costs. Days on feed and feed conversion are important production measures to watch to optimize the amount of feed fed, reducing feed costs.

The uncertainty around feed prices now may present opportunities and challenges. Grain prices are down but changing global markets can change that quickly. Pricing opportunities may exist now at lower prices. Some feed ingredients may be experiencing supply chain issues and alternatives may need to be used.

Risk is an inevitable part of farming. Today's environment of market, labour and supply chain risks make risk management key on any farm.

There are some unique features of the tools, in addition to the standard revenue and cost lines of enterprise budgets there is also an opportunity to assess the risk involved with several key risk factors. Figure 2 shows the risk factors for the farrow to finish budget. The Optimistic and Pessimistic expectation should be the best and the poorest result you would reasonably expect to occur 1 out of every 6 years. This process can highlight areas of highest risk that need to be tracked more closely as conditions change quickly.

The swine industry is no stranger to market price volatility. The expected market price in Figure 2 was the average 2019 price (100 index), the price picture has now changed significantly. Updating the expected price will show the resulting effect on profitability. The tools cannot change the market realities but can give you insights into the extent of their impact and help plan your cash flow needs accordingly to manage through downturns.

There is a risk analysis at the end of the worksheet based on the ranges entered for the risk factors. The greater the range in possible outcomes, the greater the risk of the enterprise. You can compare the risk level of the enterprise with other enterprises.

There are other uses for the tools as well. If you are planning to build a new barn, the tools can help you determine the right size/capacity to fit your production plans. For example, based on the production data entered in Figure 1 the farrowing room would require at least 55 crates for the 300-sow operation. Change the budget to a 500-sow unit, keeping all other production factors the same, it would need 90 crates.

Cost of production used as a planning tool can help make farm decisions and increase its value. The Ontario Enterprise Budgeting Tools are available at: www.omafra.gov.on.ca/english/busdev/bear2000/Budgets/budgettools.htm

John Molenhuis,
Business Analysis and
Cost of Production Specialist,
OMAFRA
john.molenhuis@ontario.ca
613-920-2162

OAHN Swine Small Scale Herd Postmortem Project

The Ontario Animal Health Network (OAHN) is beginning a new study to identify disease issues in small scale swine herds in Ontario. Through this work, we hope to also establish and expand connections with small scale producers in the province. The study will build on previous OAHN projects for disease surveillance in poultry small flocks and small ruminant herds, which provided a wealth of practical information for producers and veterinarians.

Half of the world's pig population is raised in small scale herd settings (Dietze et al, 2011) and similar herds also exist in Canada and Ontario. Small scale swine production has been researched in other countries but to date there are no known studies of this subset of swine herds in Ontario.

The goals of the project are:

- identify disease problems in Ontario small scale swine herds
- establish and maintain communications between small scale producers, veterinarians and OAHN
- increase awareness of zoonotic and foreign animal diseases among small scale swine producers.

Enrollment in the project and sample submission for testing must be done through the herd veterinarian. Disease surveillance will be accomplished through subsidized postmortem examinations on pigs from small scale herds. Laboratory tests on samples from postmortem exam will also be subsidized. For individual cases, postmortems may be conducted either at the Animal Health Laboratory (AHL) or by the herd veterinarian. Animals will be tested for a variety of diseases depending on the presenting complaint and the age of the animal. Test results will be reported to the herd veterinarian, who will communicate these findings to the producer.

For this project, a small scale herd is defined as having 50 or fewer sows, OR marketing 1000 or fewer hogs per year. Completion by the producer of a short, user-friendly survey on herd management will be required in order to qualify for subsidized testing. A premises identification number (PID) is also required to participate. Findings from the project will be made available to industry stakeholders in the winter of 2020-2021.

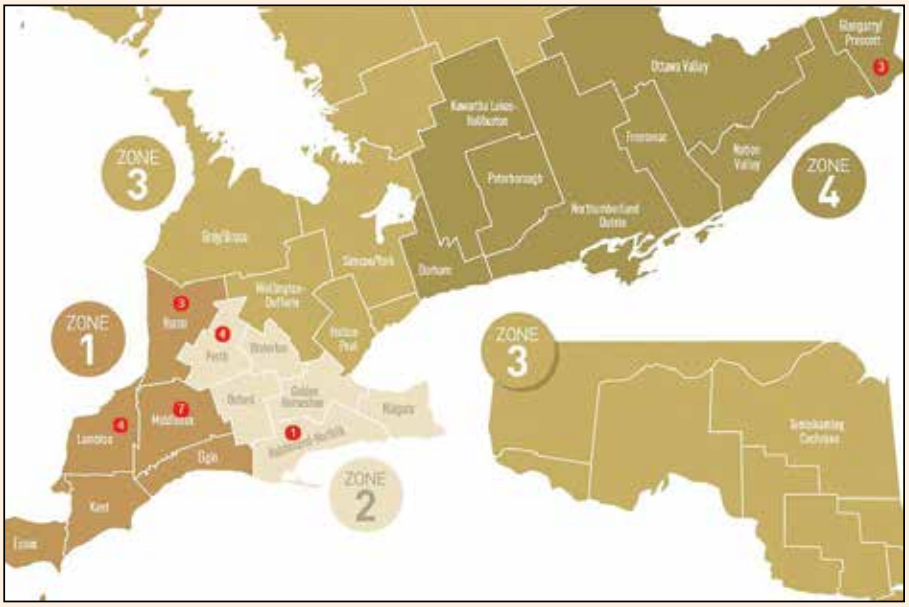
For more information on the project, please contact your veterinarian or Dr. Josepha DeLay at the AHL (jdelay@uoguelph.ca or 519-824-4120 ext 54576).

Porcine Epidemic Diarrhea virus (PEDV) in Ontario Update

The following information is an excerpt from the Jan-Mar 2020 Ontario Animal Health Network Swine Producer/Industry Report. To see the full report visit www.oahn.ca/networks/swine.

Dr. Tim Pasma reported that there were 18 new sites detecting PEDV in Q1 that includes 4 sow herds, 11 grow-finish herds and 3 finisher. The first case in Q1 was reported on Jan. 18, 2020 and signaled the beginning of this outbreak. Some connections have been made to an assembly yard point of contact, transport and to shared staffing resources. There were no new Porcine Deltacoronavirus (PDCoV) sites reported in Q1. Since the end of Q1 new site detections with PED have continued and are reflected in the map below

As of March 31, 2020 OMAFRA will no longer be following up on PEDV or PDCoVtraceback investigations for sites located in Ontario. Both pathogens will remain on the immediately notifiable disease list, so veterinarians are still obligated to report new sites to OMAFRA. Swine Health Ontario (SHO) and Ontario Pork (OP) have worked with OMAFRA to develop a transition strategy that should be communicated in the next few weeks.



Ontario Pork has produced these posters in a number of languages. Download them at **www.ontariopork.on.ca/Communications/ASF-Resources**. Post them where people will see them and help spread the message. *In the meantime, clip this page out and post it at the barn entry.*

Ontario Ministry of Agriculture,
Food and Rural Affairs

Ontario

2020 Ontario Monthly Hog Market Facts

Compiled by Jaydee Smith, Swine Specialist, OMAFRA *jaydee.smith@ontario.ca*

Month	Jan '20	Feb'20	Mar'20	Apr'20	May '20	Jun'20	1st 6 mo.
100% Formula Price ($/ckg, 100 index)	$141.78	$137.59	$151.67	$131.83	$157.67	$121.02	$140.26
*** Same Month - Previous year**	**$135.65**	**$133.45**	**$139.01**	**$193.73**	**$202.91**	**$190.33**	**$165.85**
Average price ($/ckg, DW total value)	$186.44	$173.73	$182.58	$171.69	$205.98	$180.42	$183.47
Low price ($/ckg, DW total value)	$154.00	$152.23	$161.53	$148.36	$165.33	$135.79	$152.87
High price ($/ckg, DW total value)	$241.63	$219.71	$222.44	$214.87	$254.14	$239.15	$231.99
Ontario Market Hog Sales	503,532	403,451	403,451	376,059	452,398	402,664	2,567,540
***% Change Same Weeks - Previous Year**	**-0.6%**	**-0.3%**	**3.1%**	**-4.1%**	**-11.4%**	**-0.05%**	**-3.5%**
Average Carcass Weight (kg)	106.96	105.87	105.44	104.50	105.31	104.09	105.36
Weaned Pigs ($/pig, 5 kg)**Formula	$36.86	$35.78	$39.44	$34.28	$40.99	$31.47	$36.77
Feeder Pigs ($/pig, 25 kg)**Formula	$58.48	$56.76	$62.57	$54.38	$65.04	$49.92	$58.16
Value of Canadian Dollar (US$)	$0.7646	$0.7526	$0.7178	$0.7100	$0.7156	$0.7386	$0.7332
*** Same Month - Previous year**	**$0.7490**	**$0.7577**	**$0.7499**	**$0.7478**	**$0.7431**	**$0.7526**	**$0.7498**
Prime Interest Rate at End of Month	3.95%	3.95%	2.95%	2.45%	2.45%	2.45%	3.03%
Corn (farm price) - $/tonne	$210.98	$212.03	$206.17	$181.73	$179.29	$187.35	$196.26
*** Same Month - Previous year**	**$198.68**	**$198.93**	**$194.31**	**$192.73**	**$207.23**	**$236.38**	**$204.71**
Soybean Meal (Hamilton + $20)-$/tonne	$471.25	$460.74	$523.00	$531.86	$515.03	$503.86	$500.96
*** Same Month - Previous year**	**$513.56**	**$494.96**	**$488.39**	**$487.55**	**$486.30**	**$534.99**	**$500.96**
Corn - Western Ontario Feed - $/tonne	$225.06	$224.95	$225.43	$201.55	$193.09	$196.88	$211.16
*** Same Month - Previous year**	**$215.54**	**$209.03**	**$208.35**	**$204.94**	**$219.12**	**$248.51**	**$218.29**
DDGS FOB Chatham/Sarnia/Alymer ($/tonne)	$218.80	$191.50	$205.25	N/A	$264.17	$230.25	$241.39
*** Same Month - Previous year**	**$177.13**	**$174.00**	**$187.80**	**$205.38**	**$204.80**	**$199.38**	**$191.42**

Summary of OMAFRA Swine Budget ($/pig, Farrow to Finish)

Value of Market Hog	$198.39	$215.60	$165.37	$172.79	$169.32	$166.10	$187.37
Feed Cost	$122.65	$123.95	$128.08	$128.93	$127.71	$126.67	$122.99
Other Variable Costs	$44.91	$44.76	$45.00	$44.85	$44.90	$44.96	$45.29
Fixed Costs	$24.55	$24.55	$24.55	$24.55	$24.55	$24.55	$24.55
Total Costs	$192.12	$193.24	$197.63	$198.33	$197.16	$196.19	$192.83
Net Return	-$29.41	-$33.56	-$17.72	-$39.83	-$7.67	-$50.11	-$29.72

Ontario

Swine Budget – June 2020

Compiled by Jaydee Smith, Swine Specialist, OMAFRA *jaydee.smith@ontario.ca*

Income ($/pig)	**Farrow to Wean**	**Nursery**	**Grow-Finish**	**Farrow to Finish**
Market Pig @ 101% of Base Price $121.02/ckg, 110 index, 104.09 kg plus $2 premium				$141.95
Variable Costs ($/pig)				
Breeding Herd Feed @ 1,100 kg/sow	$14.50			$15.90
Nursery Feed @ 33.5 kg/pig		$16.83		$17.74
Grower-Finisher Feed @ 287 kg/pig			$86.47	$88.81
Net Replacement Cost for Gilts	$2.85			$3.24
Health (Vet & Supplies)	$2.16	$2.10	$0.45	$5.03
Breeding (A.I. & Supplies)	$1.80			$1.98
Marketing, Grading, Trucking	$0.95	$1.60	$6.01	$8.74
Utilities (Hydro, Gas)	$2.40	$1.41	$2.17	$6.29
Miscellaneous	$1.00	$0.10	$0.20	$1.40
Repairs & Maintenance	$1.35	$0.61	$2.34	$4.46
Labour	$6.27	$1.85	$4.15	$12.98
Operating Loan Interest	$0.34	$0.39	$0.98	$1.76
Total Variable Costs	**$33.62**	**$24.89**	**$102.77**	**$165.87**
Fixed Costs ($/pig)				
Depreciation	$4.51	$2.04	$7.79	$14.88
Interest	$2.53	$1.14	$4.36	$8.33
Taxes & Insurance	$0.90	$0.41	$1.56	$2.98
Total Fixed Costs	**$7.94**	**$3.59**	**$13.70**	**$26.19**
Summary of Costs ($/pig)				
Feed	$14.50	$16.83	$86.47	$120.11
Other Variable	$19.12	$8.05	$16.30	$45.76
Fixed	$7.94	$3.59	$13.70	$26.19
Total Variable & Fixed Costs	**$41.56**	**$28.48**	**$119.03**	**$194.88**

Summary	**Farrow to Wean**	**Feeder Pig**	**Wean to Finish**	**Farrow to Finish**
Total Cost ($/pig)	**$41.56**	**$71.73**	**$146.48**	**$192.06**
Net Return Farrow to Finish ($/pig)				**-$50.11**
Farrow to Finish Breakeven Base Price ($/ckg, 100 index) includes 101% Base Price & $2 Premium				**$164.35**
Farrow to Finish Breakeven Base Price ($/ckg, 100 index) excludes 101% Base Price & $2 Premium				**$167.74**

This is the estimated accumulated cost for a market hog sold during the month of June 2020. The farrow to wean phase estimates the weaned pig cost for January 2020 and the nursery phase estimates the feeder pig cost for March 2020. For further details, refer to the "2020 Budget Notes" posted at: http://www.omafra.gov.on.ca/english/livestock/swine/finmark.html

MOE'S MARKET MINUTE

U.S. PORK SLAUGHTER CAPACITY RECOVERS

by
MOE AGOSTINO
& ABHINESH GOPAL

While the hog industry still faces some headwinds, analysts see signs of increased demand.

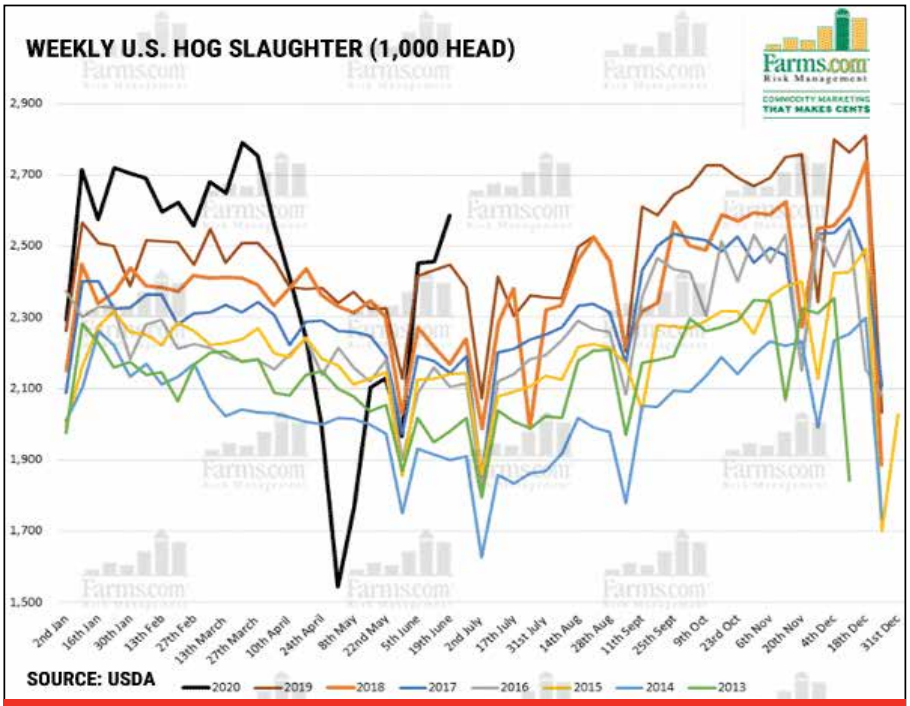
Salomonus_/iStock/Getty Images Plus photo

Once plants process the backlog of hogs, the market will be in better position for a recovery bounce.

In the ag industry, the pork sector was likely the hardest hit during the COVID-19 pandemic. That tough situation became even more difficult with increased U.S.-China trade uncertainty.

COVID-19 outbreaks at American hog slaughter plants led to facility closures, causing a back-up of market-ready hogs on farms. This situation weighed on lean hog values.

American weekly hog slaughter numbers fell by roughly 45 per cent from late March to the start of May. In late March, the figure was 2.8 million head and dropped to 1.5 million head in early May.



COVID-19 cases at packing plants led to facility closures and a reduction in U.S. slaughter capacity.

Farmers fed their herds slower-growth diets but this strategy only bought producers an extra two weeks. As a result of the continued back-up of hogs, many farmers started to euthanize pigs in late April and early May.

The hog back-up on farms in May was 10 million pigs, some market analysts forecast. This estimate was overstated, however; two to three million head is a more accurate number for the industry.

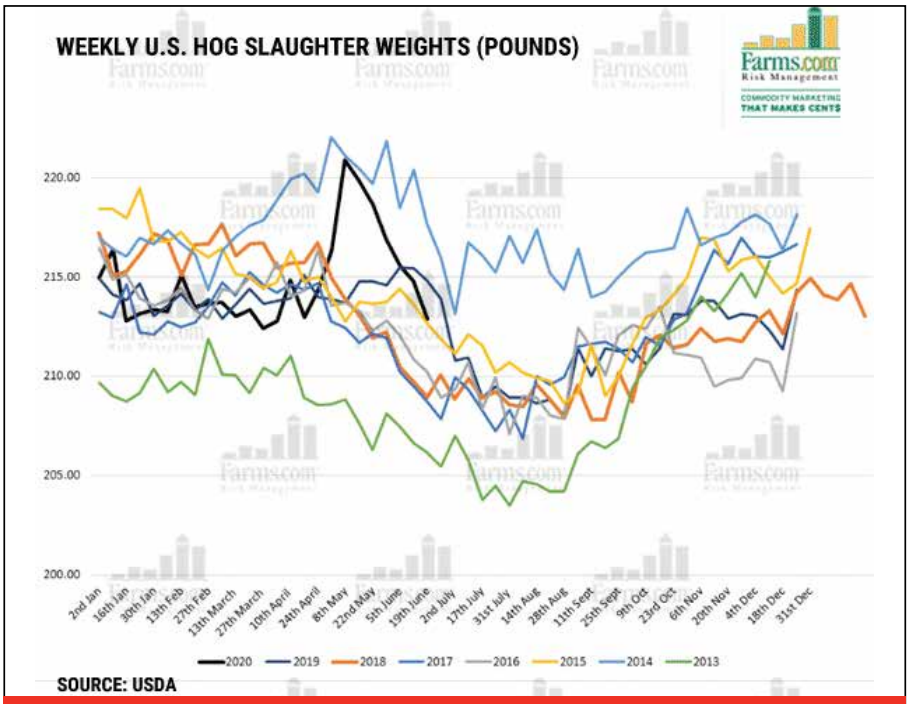
When the COVID-19 crisis affected the hog slaughter plants, the U.S. Defense Production Act declared the plants to be critical infrastructure. This situation meant the country's slaughtering rates recovered much sooner than expected. The relevant executive order came into effect on April 28.

Combined with record packer margins, this government move encouraged closed plants to reopen as fast as possible.

As COVID-19 cases at American hog slaughter plants decreased and officials enacted safety measures, packing plants reopened in May. The V-shape recovery in slaughter rates meant that plants slaughtered 67 per cent more hogs in late June compared to early May. Thanks to record profits, packers had the incentive to kill more hogs.

In fact, during the pandemic, U.S. wholesale pork values soared to record highs. Packer margins at these highs equated to over US$100 per head. Despite the loss of demand in the food service industry, tremendous retail demand supported the strong pork values. Retail demand for meat more generally soared between March and May.

The American retail price for pork rose from around US$3.85/pound at the beginning of March to US$4.05/lb. at the end of May, U.S. Department of Agriculture (USDA) Economic Research Service data showed. The latter figure was the highest price since 2014.



In April and early May, U.S. hog slaughter weights soared as more hogs got backed-up on farms.

In this unprecedented time, Americans did not have a shortage of pork at the retail level; rather, the shortage was more in terms of U.S. pork processing capacity.

In May, the drawdown in U.S. cold storage supplies was the largest ever. This drawdown resulted in the smallest pork stocks figure since 2010.

During the shortfall in slaughter rates in April and early May, American hog average carcass weights initially increased. The recovery in processing capacity led the average weight to fall by about 6 lbs. (2.7 kilograms) in late June compared to the start of May. Late-June average weights were lower than before COVID-19 and followed the seasonal pattern of decreased weights during the summer months.

The USDA June quarterly Hogs and Pigs report revealed a record all-hogs inventory of 79.6 million. This figure was 5.2 per cent higher year over year (Y/Y) and higher than analysts expected.

The breeding herd was 1.3 per cent lower Y/Y at 6.3 million head, but still higher than market analysts anticipated.

The market hog inventory of 73.3 million was 5.8 per cent higher Y/Y and the biggest contributor to setting the new all-hog inventory record.

Among the market-hog weight

categories, the inventory of the heaviest hogs (weighing at or above 180 lbs. or 81 kg) was 14.7 million. This figure was 12.8 per cent higher Y/Y and this increase can be linked to the "extra" feeding of backed-up hogs on farms. The inventory of 120 to 179 lbs. (54 to 81 kg) market hogs was also large at 16.1 million head. This figure was 11.8 per cent higher Y/Y.

As of late June, slaughter levels ran higher Y/Y, which was a positive development. Weekly American hog slaughter rates will need to rise to 100 per cent of capacity and Saturday kills need to be higher than normal for the sector to clear the on-farm backlog of hogs.

But some plants still struggle with worker absenteeism due to fears about COVID-19. So, the risk of the need for hog euthanasia remains.

As of late June, slaughter capacity utilization was only above 90 per cent. In this period, the weekly U.S. hog slaughter was at 2.641 million head, which was 10.7 per cent higher Y/Y, according to USDA data.

In June, the USDA raised its 2020 American pork production estimate to 27.8 billion lbs. (12.5 billion kg). This figure is an increase of 0.5 per cent compared to the 2019 production estimate.

Increased slaughter should help restore U.S. pork frozen supplies.

Demand will be key; can it keep up? Industry stakeholders will also need to control hog slaughter weights.

Looking ahead, in addition to the strong retail demand for pork, the restaurant demand is slowly returning. As of mid March, the number of Americans who made online and phone reservations or simply walked into restaurants had started to drop drastically compared to the prior year, data from OpenTable showed. OpenTable offers online restaurant reservations.

The company calls these customers seated diners. Between mid March and mid May, the Y/Y drop in seated diners was about 100 per cent. By early June, seated diners remained down by 80 per cent Y/Y. By late June, this figure had recovered to roughly 60 per cent Y/Y.

Once plants process the backlog of hogs, the market will be in better position for a recovery bounce.

However, risks remain and are mostly two-pronged. First, a second wave of COVID-19 would dampen the recovery from the pandemic.

Second, the ongoing American trade wrangle with China could weigh heavily on U.S. pork export demand if the trade deal hits a roadblock. In fact, late-June reports suggested that China would enact trade barriers for poultry, pork and beef exporters. If this situation materializes, American processing plants could have too much meat for U.S. consumers to absorb. Hopefully, the potential compliance issue will be short-lived.

The missing piece of the puzzle is the demand shock from the reopening of the food service industry and American restaurants.

Although this reopening was slower than expected, do not discount consumer confidence. It will be the glue that will hold all the puzzle pieces together. **BP**

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Looking ahead, in addition to the strong retail demand for pork, the restaurant demand is slowly returning.

Maurizio "Moe" Agostino is chief commodity strategist with Farms.com Risk Management and Abhinesh Gopal is head of commodity research. Risk Management is a Farms.com company.

Visit RiskManagement.Farms.com for more information.

by
RICHARD
SMELSKI

THOUGHTS ON SCALE IN THE PORK INDUSTRY

As we think about possibilities for the future of our industry, we must weigh a range of factors.

malerapaso/iStock/Getty Images Plus photo

Has society conditioned us to believe that "bigger is better" when the opposite may be more appropriate?

In your discussions with other people in the industry, you may have heard – or even said – something along the lines of "I don't want to get any bigger. I just want to own my neighbour's property."

These types of conversations make me wonder if it is time to rethink economies of scale in the pig industry. I reread E.F. Schumacher's *Small is Beautiful: A Study of Economics as if People Mattered* to help prompt my reflection. Schumacher was an economist and statistician who questioned society's emphasis on the pursuit of profits and progress.

This mindset caused many problems, including economic inefficiencies, he said. Instead of focusing on production and results, we should focus on people. Instead of our increased specialization and pursuit of economies of scale, we should reorient to local labour, smaller working units and even communal ownership, Schumacher said.

Has society conditioned us to believe the idea that "bigger is better" when the opposite may be more appropriate?

Organizations continue to grow in an attempt to achieve economies of scale. However, this growth can create inefficiencies like more organizational layers, slow decision-making, and reduced operational flexibility. Increased scale can also create increased risk.

The challenge of disease spread serves as a case in point. And, of course, African swine fever (ASF) is a recent example in our industry. Officials reported an outbreak of ASF in Shenyang, China in August 2018.

Within about a year, the country's pig population decreased by about 40 per cent. As China accounts for a significant portion of the world's pig population, the deaths there equated to the loss of nearly 25 per cent of the global herd.

The disease spread to other countries in Asia, Europe and Africa. As of July 9, a total of 7,043 ASF outbreaks existed worldwide, the World Organisation for Animal Health reported.

We can also look at the issue of scale a bit closer to home. The Canadian pork industry could focus on boosting exports. After all, our product is certainly a valuable and high-quality protein.

But the move to increased exports involves a range of risks, stemming from such factors as health challenges (herd or human), supply chain disruption, and political interferences or trade sanctions.

Economies of scale certainly play a factor in how businesses operate. Smithfield Foods, for example, is the world's largest pork producer. The leadership team in that company must think differently than my neighbour with a 300-sow operation.

All pork producers must also deal with manure management, employee health and safety, and the Nimby mindset. The latter concept refers to the "not in my backyard" perspective held by a segment of individuals or groups opposed to some farming practices.

In addressing each of these business operating responsibilities and challenges, pork producers must adhere to government regulations and navigate sometimes complex human relationships.

Arguably, the biggest challenge on both the production and processing sides of the swine industry is the recruitment and retention of skilled labour. Producers need workers in barns seven days a week because we have yet to invent a five-day sow.

The viewpoints of consumers and their purchasing preferences add another layer of complexity to the management of our operations.

So, when making business decisions, we have the difficult job of weighing both economic and philosophical factors. **BP**

Richard Smelski has over 35 years of agribusiness experience and farms in the Shakespeare, Ont. area.

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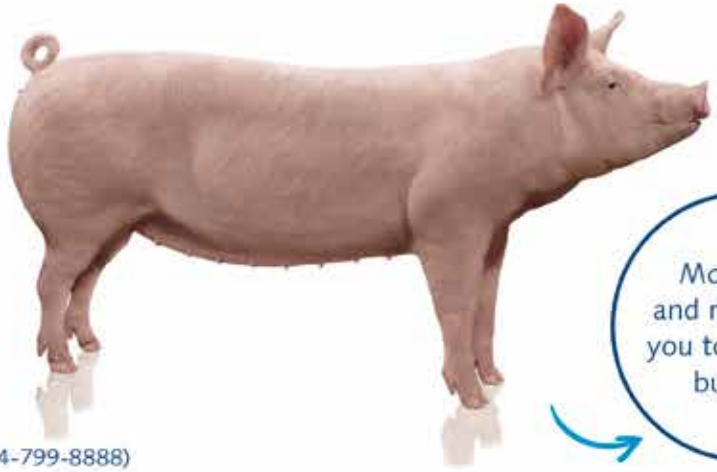

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